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Effect of Tension in Mercerization

The Findings as to Effect of Tension—Object of the Present Investigation—The Apparatus and Material—Procedure of Making the Runs—The Findings—Explanation of Shrinkage

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MERCERIZATION dates back to the discovery, in 1844, by John Mercer of the effect of caustic on cotton cloth, followed by the discovery by Lowe, in 1890, of the fact that subjecting cotton to tension while mercerizing gave increased luster. The effect of the strength of the caustic on mercerization is well known, and the effects of time and temperature on the process have been fairly well established; but as to the effect on tension, very little is known.

The only authoritative results as to the effect of tension are those of Herbig, which may be summarized as follows:

1. Mercerization without tension gives no luster, while even a small amount of tension gives some increase in luster.

2. The maximum luster is obtained when the tension is sufficient to bring the yarn back to its original length, and any increase in tension above this point does not increase the luster.

3. The luster obtained by impregnating with caustic and washing, both while under tension, is the same as that obtained by impregnating loose and washing under tension; but the tension required in the first case is three or four times as much as in the second case.

4. The luster obtained by impregnating and washing loose and then stretching to the original length is much inferior and the force required is very high.

5. The tighter the twist of a yarn the greater is the tension required to obtain a given luster.

6. Any cotton has its luster increased by mercerization, but the finer cottons receive the highest luster.

Object: to Study Tension for Luster

The object of this investigation was to obtain more data on the second conclusion above; that is, to determine what tension gives the maximum mercerization.

Modern mercerization is carried out for strength or for luster, usually for the latter; but since attempts to measure the luster by various methods were unsuccessful it was necessary to measure the extent of mercerization by shrinkage, breaking strength and elasticity. Some qualitative observations as to the luster confirmed the results, so far as could be judged.

The apparatus used is shown in Fig. 1. The yarn is held between the hooks (H) under a tension determined by the weight (W) on the opposite side of the beam (B). The beam is supported on a knife-edge (K) and on one end has an indicator (I) passing over a scale (S) which measures the shrinkage during the

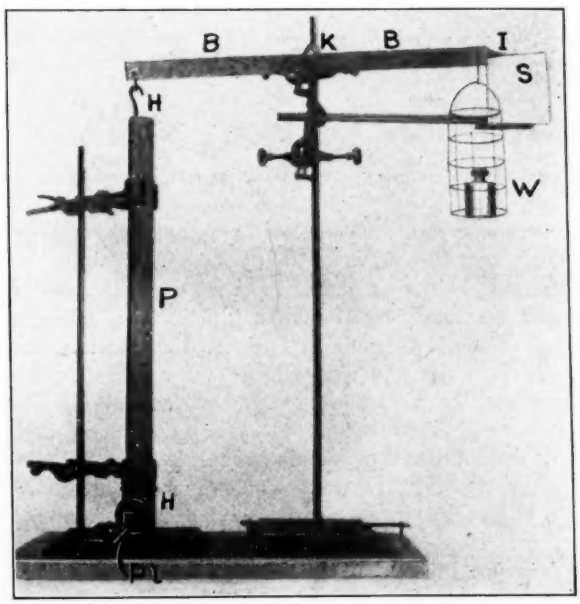

Fig. 1

process. The caustic solution is held in a section of pipe (P) which surrounds the yarn and is fitted with a plug (P1) at the bottom for quick removal of the solution.

The yarn used was two-ply 20's yarn of American cotton reeled off on a 36-inch reel into 80-yard skeins. This yarn was given a boiling out in 1% sodium carbonate solution for one-half hour before mercerization and each skein was measured, after boiling out and drying, by means of a standard weight with pointer attached which was hooked onto the skein as it was held opposite a scale. The length of the skein after mercerization and drying was determined similarly and the shrinkage calculated. The maximum shrinkage during mercerization and the final shrinkage while wet (after mercerization but before drying) was directly observed on the scale of the apparatus.

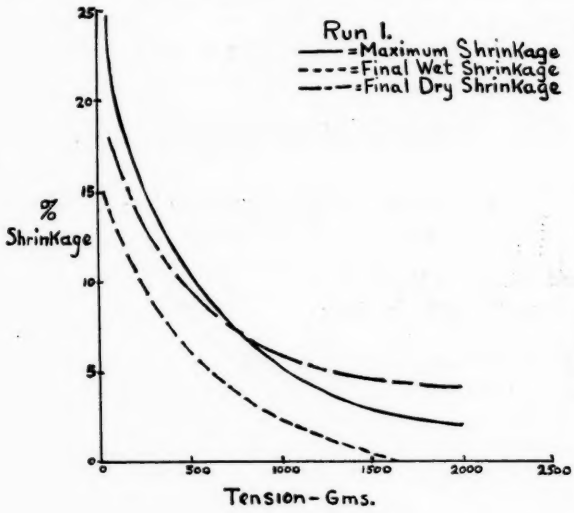

FIG. 2

PROCEDURE OF MAKING RUNS

The caustic used, of a density of 50° Tw., had been titrated, and had had any sodium carbonate removed by the addition of the calculated amount of lime water.

Each run was made as follows: A boiled-out and measured skein was placed in the hooks, the tension weight was added, and the position of the indicator on the scale was noted. The caustic solution was poured into the pipe and left for three minutes; the plug was then unscrewed and the caustic allowed to flow out. Following this, five successive changes of water were allowed to remain in the pipe for one minute each, and then the excess caustic was neutralized by 10° Tw. sulphuric acid for one minute, followed by three more washings. The acid was removed by 1% ammonia solution, followed by more washing. The maximum shrinkage was observed to occur during the second wash after the caustic. The final wet shrinkage was observed just before the removal of the skein. After removal, the skein was allowed to air-dry and was then measured again.

The breaking strengths and elongations were obtained, after conditioning the yarn at 70° F. and 65% relative humidity, on a Schopper single-strand tester. The average of ten tests was taken in each case.

Two runs were made, keeping everything else constant but varying the tension on the skein. The results are given in the following tables and graphically in Figs. 2, 3 and 4.

RUN 1

Tension	Shrinkage			Breaking Strength	Elongation at Break
	Maximum	Final Wet	Final Dry		
43.3 gm...	24.9%	14.2%	17.8%	937 gm.	18.4%
100.0 gm...	19.5%	13.6%	17.0%	843 gm.	15.1%
200.0 gm...	15.4%	10.3%	14.1%	850 gm.	13.1%
500.0 gm...	9.9%	6.0%	9.0%	815 gm.	11.3%
1,000.0 gm...	6.0%	2.7%	6.0%	799 gm.	10.7%
1,500.0 gm...	2.7%	0.3%	4.5%	831 gm.	10.9%
2,000.0 gm...	2.1%	—0.3%	2.2%	849 gm.	9.3%

FINDINGS

Examination of Figs. 2 and 3 shows the following facts:

1. The shrinkage decreases regularly, but not proportionately, with increase of tension.

2. All three shrinkages approach separate assymptotes or limits.

3. The final wet shrinkage becomes zero in both

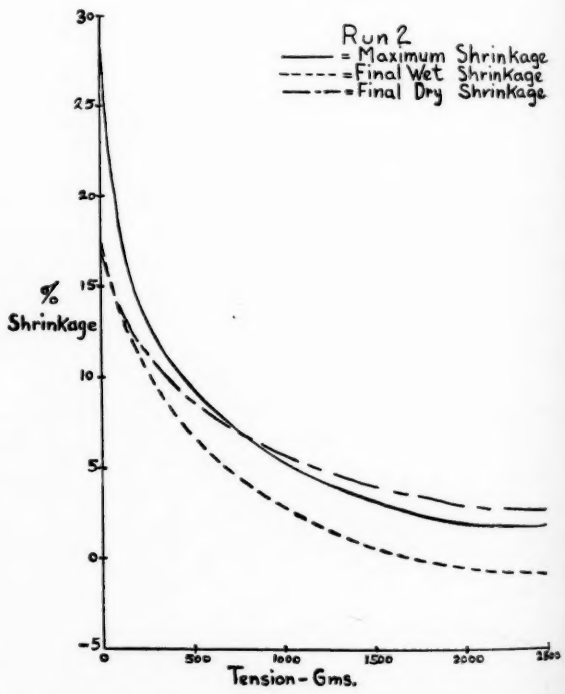

FIG. 3

RUN 2

Tension	Shrinkage Maximum	Shrinkage Final Wet	Shrinkage Final Dry	Breaking Strength	Elongation at Break
0.0 gm...	28.5%	19.4%	17.0%	1,182 gm.	19.7%
50.0 gm...	21.8%	16.4%	16.7%	1,039 gm.	13.1%
250.0 gm...	12.1%	9.1%	10.9%	896 gm.	13.5%
500.0 gm...	11.5%	7.3%	8.2%	839 gm.	9.7%
1,000.0 gm...	6.1%	3.1%	6.7%	828 gm.	10.3%
1,500.0 gm...	2.4%	—0.3%	3.9%	825 gm.	9.4%
2,000.0 gm...	2.1%	—0.9%	3.0%	862 gm.	9.5%
2,500.0 gm...	1.8%	—0.9%	2.7%	890 gm.	9.2%

cases at a tension of 1,700 grams and beyond this becomes negative or stretch.

4. Final dry shrinkage becomes equal to the maximum shrinkage while mercerizing at a tension of 800 grams, and at tensions above this is greater than the maximum wet shrinkage.

Examination of Fig. 4 gives the following:

1. The breaking strength decreases regularly with increase in tension to a minimum at about 800 grams tension, and then rises regularly, but not rapidly, through the range of the experiment.

2. The breaking strength at 1,700 grams tension is neither a maximum nor a minimum, as might be expected from Herbig's conclusions.

Explanation of Final Dry Shrinkage

The fact that the final dry shrinkage becomes greater than the maximum wet shrinkage may be explained as follows:

The final wet shrinkage is due to an increase in cross-sectional area of the fiber with a consequent reduction in length of the fiber. To get the final shrinkage after drying, we must add to this the shrinkage of the fiber due to removal of adsorbed water by means of which the total volume, including the length of the fiber, is decreased. This last amount of shrinkage is substantially constant, so that the final dry shrinkage is equal to the final wet shrinkage plus a constant. This may be seen on the graphs. The maximum wet shrinkage, on the other hand, is very great at low tensions, due to strong adsorption of caustic solution, but at high tensions this large shrinkage is partially compensated for by the mechanical stretching of the fibers; therefore, the difference between the maximum wet shrinkage and the final wet shrinkage becomes less with increasing tension. If, then, the final dry shrinkage is a constant amount greater than the final wet shrinkage and the maximum wet shrinkage is approaching the final wet shrinkage, the two will intersect at some point.

The effect of tension during the mercerization appears to be twofold; on the one hand, by increasing the length the cross-sectional area of the fiber is decreased and the strength is therefore decreased also; on the other hand, by bringing together the walls of the fiber and closing the lumen, and possibly also by forcing semi-fluid fibers together so that they may be partially cemented together, the increase in tension increases the strength. Since the final strength of the yarn will be the algebraic sum of these tendencies, and since the first tendency is greatest at low tensions and the second at high tensions, the final strength will at first decrease with the tension, will pass through a minimum, and will finally increase with the tension.

Summary

1. Shrinkages, strengths and elongations of cotton yarns were measured and tabulated for mercerization under varying tensions.

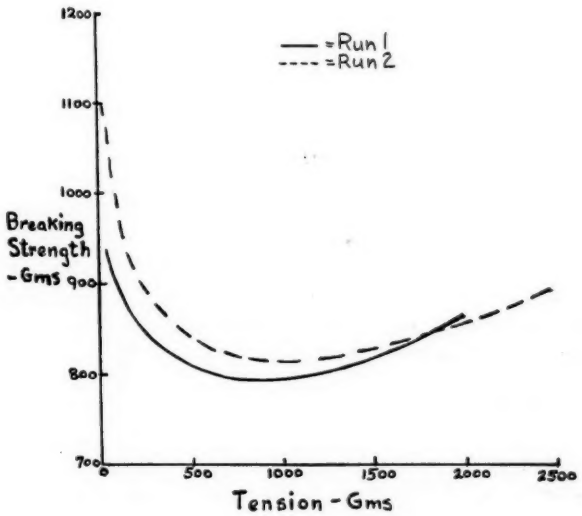

Fig. 4

2. Herbig's conclusion, that increase in tension beyond that necessary to keep the yarn its original length gives no increase in luster, was not supported by the results on the strength tests or the qualitative observations on the luster.

3. The strength of the yarn passed through a minimum point at about 800 grams tension.

4. At about this same tension the final shrinkage after drying became greater than the maximum shrinkage while wet.

5. An explanation of the above results is offered.

Franz E. Plummer has been made assistant to the manager of the Lynchburg Division of the Consolidated Textile Corporation. Mr. Plummer is a graduate of the class of 1927, North Carolina State College. He was awarded the Student's Medal by the National Association of Cotton Manufacturers for the highest proficiency in his work during the four years he was in college.

Contrasting Colors as Trade-Marks

(Written Expressly for American Dyestuff Reporter)

By Waldon Fawcett

MAY the would-be brander of merchandise find salvation by introducing in the goods colors that are in opposition to one another? Putting the problem differently, is it possible to secure, by the use of contrasting colors, an individuality in the appearance of an article of commerce that might not be attained by the use of any single or solid color? That is to say, an individuality that will be recognized by the Federal Government as constituting an exclusive property right.

The question is very much in order because business houses in various lines are scheming and skirmishing to find means of establishing monopolies in recognizable color clues. Only in part is all this a sequence and by-product of the stampede to color in all industries. Rather is it that manufacturers, having experienced the difficulties that attend the securance of Federal recognition for single colors as trade-marks are now turning hopefully to the alternative of color combinations. By means of unusual color mixtures the trade-marker may, moreover, get farther away from the standing objection of the censors that there is but a limited number of primary colors and nothing can be condoned that would isolate any basic color which, like descriptive words, is free for the common use of all.

When Color Combinations May Be Registered

Powers that be at the U. S. Department of Commerce were required, recently, to define the official attitude on contrasting colors as trade-marks. An appeal was taken to the Commissioner of Patents in a case that hinged on the contrasting use of red and black. The ruling was that contrasting colors, in themselves, have infallible claim to trade-mark status. That status is conferred only when the color contrast or combination is of such a nature as to impress the public mind as having no other purpose than to serve as a mark of identification or origin or ownership. In short, the color touch, to be registrable at Washington, must be superfluous. Not merely ornamental or decorative and yet withal so devoid of any utilitarian responsibility as to bear out the idea that it has been added solely as a token of possession.

Application of this doctrine in the current instance has served to emphasize a limitation that is logical enough but might escape notice. The requirement that a color combination shall be meaningless for any purpose, save that of distinguishing the goods, operates to bar what may be accounted the natural colors of goods or any color elements created incident to processes of manufacture. Thus, a combination of red and black in rubber goods or a touch in textiles expressive of the natural colors of yarns (or what the public thinks of as being the natural colors) is a particularly poor risk for trade-mark protection.

The very multiplicity, latterly, of color marks in commerce has brought to the fore an unexplored phase of contrasting colors, i. e., the degree of contrast between parallel color marks that is necessary to avoid confusion in trade. The principle is well entrenched that a prior user may establish proprietary rights in his chosen color but cannot prevent competitors from using other colors in the same relationship to the same class of goods. That doctrine was accepted without much complaint for a time. But latterly, as all the colors are being taken up, there is a demand for more privacy, via sharper contrasts between the hues of neighboring color users. In a recent business duel in the Federal tribunal, the senior party protested against admission of a green element as a trade-mark on the ground that it was particularly liable to confusion with blue, which had already been sanctioned for use in the same environment.

Colors Suggesting Contrast

A number of rulings in recent years have combined to build up a belief on the part of color capitalizers that contrasting colors are capable of miracles far beyond lone colors. One of these confirmations, having to do with names which are the equivalents of color, came of the decision of the United States courts in what is commonly referred to as the Plough Chemical Company case. In that case the court held that the trade-mark "Black and White" was not deceptively similar to the mark "Red and White," when used upon the same goods. The hopeful keynote in this decision was found in the observation by the court that the rival color terms "suggest contrast rather than identity."

There are more ways than one of employing color contrasts for trade-mark purposes. When mention is made of contrasting color as a means of branding the vision, what commonly comes to mind is that of a composite mark formed by an alliance of two or more sharply differentiated colors—colors that are a contrast in hue and, maybe, in brilliancy as well. But when trade-mark specialists speak of the potentialities of contrasting colors they may have reference to the color opposition between two different trade-marks owned by different parties. It is the official expressions upon the efficiency of this use of contrasting colors that have been largely responsible for the belief that contrasting colors are infallible as vehicles of trade-marking.

Sufficiency of color contrast to keep apart two trade-marks was emphasized by the head of the Patent Office in umpiring a dispute between two branders who were employing similar trade-mark carriers, the one version red and the other blue. The Commissioner fell back upon trade custom as encouraging to color sensitiveness, saying that it is so common in industry to color various goods that purchasers are quite accustomed to note the

contrasting colors employed. Therefore the distinctive color adopted by one brander "would be considered by purchasers as in sharp contrast" to the color adopted by his opposer.

Harking back to the idea of color contrasts within the same article and the possibility of turning such contrasts to trade-mark account, it must be noted that the Department of Commerce holds that, sometimes, color contrasts are accepted by the public as not fanciful nor arbitrary but as conventional. It is pointed out that in some industries it is common practice to color different parts of the various articles of trade in contrasting hues for utilitarian and ornamental purposes. "Such contrasting color," said the Federal arbiter, "produce no other effect upon the public mind than that of ornamentation."

Colors for Identity Only

On occasion, the Patent Office censors have cited concrete examples of the types of color contrast which may be recognized as a valid expedient of trade-marking. One such example is the practice, now fairly common, of introducing contrasting colors in the strands of ropes, cords, etc. The formula is open to all. But so long as a new color treatment is in contrast to anything and everything already existing in the same field, and so long as the colors are extra added features, having no other function than that of identification, a fresh combination should be assured a welcome at the trade-mark clearing house no matter how many color variants have gone before.

When called upon to determine whether contrast in colors serves a trade-mark purpose, the official appraisers at Washington endeavor to estimate the effect likely to be produced on the mind of the public by the color conceit. Anything that, in the eyes of the layman, is likely to accentuate color contrasts is taken into favorable consideration. On the other hand, a color set-up may be distinctive as to appearance, yet if its distinctiveness does not impress the average person with the fact that it constitutes a trade-mark the authorities will not issue a certificate.

With would-be branders turning in desperation to identification by means of color combinations as the only escape from the difficulties of solo colors, a note of caution should be sounded in respect to any ambition to effect a color contrast, or emphasize such contrast, by the position of the combining colors. Especially is there risk if the positioning of the colors is the natural result of the processes of manufacture or is dictated by utilitarian considerations. The official prejudice against logical color placements is well shown by the rulings that there is no valid trade-mark in coloring an automobile tire one color on the sides and another on the thread. The Federal reasoning is that the making of the sides and tread of different materials, and consequently of different colors, is functional. The censors at Washington make the further objection to these, as they might be termed "inevitable" color contrasts, that the trades where they occur do not ordinarily think of them or accept them as distinguishing marks of origin.

PRICE-FIXING PACT SIGNED BY EUROPE'S DYE TRUSTS

German, Swiss and French Cartels Complete Sales Agreement on Export Quotas

THE three most powerful chemical cartels on the continent of Europe have formally signed a sales agreement that will regulate dye prices and apportion their total export trade among them, according to an announcement from the Department of Commerce issued July 20.

To this sales agreement the chemical trusts of Germany, France and Switzerland have affixed their signatures, and the report states that its significance lies in the fact that the oral agreement in force among these dye manufacturers during the past four years has now been made permanent. The three countries involved in the pact have an annual trade in coal-tar dyes that accounted in 1927 for more than three-fourths of the world's dye exports in quantity and four-fifths of the value.

The participants were the German I. G. Farbenindustrie, the French dye firms—Etablissements Kuhlmann and the Societe des Matieres Colorantes de Saint Denis—and the Swiss Basler I. G. The Swiss Basler I. G. comprises the A. G. fuer Chemische Industrie (Ciba), Chemische Fabrik Vormals, Sandoz, which is closely connected with the A. G. fuer Chemische Industrie, and the J. R. Geigy, A. G.

It is understood that the Clayton Aniline Company, the English subsidiary of Ciba, which has consistently increased its sales in spite of competition from other English chemical companies, will operate under the terms affecting its parent company. Other subsidiaries of Ciba which are said likewise to be affected are the French subsidiary at Saint Fons, the Polish subsidiary, S. A. Pabiancoise pour l'Industries Chimique, and the Italian subsidiary, the Sta. Bergamasca per l'Industriea Chimica, Seriate.

The statement of the Commerce Department, based on reports from American commercial attaches and trade commissioners in Paris, Berlin, Frankfort-on-Main, Berne and Balse, also showed that the value of dyes exported by the combination in 1928 was $93,800,000 as compared to $73,200,000 in 1927 and $65,000,000 in 1926.

Agreement Is Made to Regulate Prices

Much emphasis is laid upon the preservation of independence in technical and commercial details. Each country retains its independence as to capitalization, profits and commercial development. Though the agreement is referred to as a sales agreement, it is in reality

an agreement for regulating and stabilizing the prices of the standard dye products.

Although the details have not been made public, authoritative sources give the following as the basis of the accord:

The fixation of prices in the various markets in such a way as to obtain an average return for the adherents, after taking into consideration the factors of quantity and quality, transportation charges, services, etc.

The establishments of export quotas for the three participants.

The continuation of Franco-German collaboration as regards sales and the continued use of common sales bureaus, particularly in the East, with the Swiss maintaining their independent sales organizations.

The periodical readjustment of the participation of the adherents in the major market regions.

The exchange of information on methods of production and utilization of dyes in various industries.

There is no indication of a pooling of profits.

No details have been made available regarding the plan to regulate prices, other than the statement that it is believed that consumers throughout the world will benefit by economies to be derived by a common effort to improve packing and to rationalize distribution by effecting more direct deliveries.

The French and German export quotas have been altered to take account of the Swiss sales. The 1927 agreement allotted 80 per cent to Germany and 20 per cent to France. At that time, when the participation of England was under consideration, the quotas drafted were 75 per cent for Germany, 12 per cent for France, and 13 per cent for England. During the negotiations in the fall of 1928 the tentative quotas for Germany, France and Switzerland were understood to be 70, 20 and 10 per cent, respectively. It was doubtful, however, whether France was able to maintain its demand for this ratio, and it is believed that the sales made since September, 1928, have been more nearly on the basis of 75 per cent for Germany, 17 per cent for France, and 8 per cent for Switzerland. No official statement has confirmed these percentages, but it is believed that they approximate the present division of export sales under the agreement just signed.

The National Rhea Company, manufacturers of spun rayon yarns, with a mill at Putnam, Conn., and offices in Providence, has been placed in voluntary receivership. Action was taken in both Rhode Island and Connecticut courts, and Louis A. Waterman, a Providence attorney, was named receiver. N. Stuart Campbell, treasurer of the company, states that this action was taken for the purpose of reorganization. The mill at Putnam, according to Mr. Campbell, is operating as usual, and it is expected to continue operation during the proceedings and the reorganization.

SILK CONSUMERS TO SIT ON WEIGHTING BOARD

Committee Soon to Act on Definite Standards

The consumer of silks is to have some voice in determining what are the proper limits for tin-weighting, according to a decision reached last week by the joint trade committee on weighting of the Silk Association of America.

The open meeting, held July 25, was attended by representatives of more than sixty trade associations and consumer groups. The suggestion to permit consumers to be represented on the weighting board was adopted after a long discussion of the evils of excessive weighting of fabrics, and after futile attempts had been made to reorganize the entire method of investigating the weighting situation.

Within a week Edward L. Greene, managing director of the National Better Business Bureau and chairman of the joint trade committee on weighting of the Silk Association, will call a special meeting of the committee and will invite certain representatives from four or five consumer organizations, the names of these organizations to be submitted by P. G. Agnew, secretary of the American Standards Association.

An interesting suggestion with respect to the overweighting evil and its possible solution was contained in the brief address of Alexander Patterson, of the Piece Dyers and Finishers' Protective Association, which was read.

Mr. Patterson said that "if it were made necessary for the silk manufacturers to have a base construction sufficient to carry a certain percentage of weighting, it would eliminate a great deal of confusion."

"We would recommend," he said, "that the weighting be specified in the future in degrees of 10% to 20%, 20% to 30%, 30% to 40%, and 40% to 50%, according to quality and construction.

"If the trade would ask for such weighting and would construct their goods properly to withstand such percentages, we are sure there would be no difficulty in satisfying the ultimate consumer."

The American Dye Works, of Burlington, N. C., a recently organized concern capitalized for $100,000 is reported to have bought the dyeing and finishing department of the Love Knitting Company, of West Burlington. The department will be used for the finishing of gray materials made at the plants of the Standard Hosiery Mills. John Shoffer, of the Standard Hosiery Mills, was one of the promoters of the new firm.

W. J. Carter, secretary and treasurer of the North Carolina Silk Mills, Burlington, N. C., has been elected secretary and treasurer of the Puritan Weaving Company, Fayetteville, N. C. This company has taken over the old Granite-Puritan Mills of Fayetteville.

Notable Progress of the British Dyestuffs Industry*

Output of Coal-Tar Dyestuffs Increased 320 Per Cent Between 1913 and 1928—Exports of Finished Dyestuffs in 1928 Increased in Volume 25 Per Cent Compared with 1927

By Vice-Consul Wallace E. Moessner, Manchester

SYNTHETIC dyestuffs are produced in appreciable quantities at eighteen different establishments in Great Britain. The bulk of the output is produced by one company at its several works, the largest of which, together with the head office, is located in Manchester. The concern referred to is the British Dyestuffs Corporation, capitalized at £4,775,580, which is in turn a subsidiary of Imperial Chemical Industries. The principal works of the British Dyestuffs Corporation are at Blackley (Manchester), Huddersfield, Yorkshire, and Ellesmere Port, Lancashire, while it also controls Scottish Dyes (Ltd.), with its large anthraquinone vat dye works at Grangemouth, Scotland. Other important independent companies in the Manchester area include the British Alizarine, British Synthetics, Brown & Forth, Hazlewood & Sons, L. Dennis & Co., and William Edge & Co., of Bolton.

From its inception until continental competition became strong in 1873 the British industry thrived, but by 1885 a large part of the business was lost, and on the outbreak of the World War it is said that 80 per cent of the dyestuffs consumed were imported. To-day British dye makers produce around 10 per cent of the world output, and imports are not essential.

The output of classifiable market types of coal-tar dyestuffs in Great Britain increased by 321 per cent between 1913 and 1928. The output, in pounds, follows: In 1913, 11,200,000 (approximate); in 1923, 32,900,000 (approximate); in 1924, 33,242,704; in 1925, 32,693,402; in 1926, 30,296,924; in 1927, 39,551,680; in 1928, 47,120,614.

Imports Declining

As a result of the dyestuffs import regulation act of 1920 and the increasing home production imports have been steadily and materially decreasing, and the quantity imported in 1928 represents only about 10 per cent of that during 1919. About 98 per cent of the licenses issued since 1920 have been for the import of dyes from Germany and Switzerland, the former supplying about 70 per cent and the latter 28 per cent of the total.

The quantity and value of British imports of finished coal-tar dyestuffs and the average price, in pence per pound, exclusive of alizarine and synthetic indigo, follow:

British Imports of Finished Coal-Tar Dyestuffs

Year	Price, Pence per Pound[1]	Quantity, Pounds	Value[2]
1919	11.7	41,202,560	£1,892,055
1920	79.2	23,289,280	7,552,799
1921	66.7	6,686,400	1,539,406
1922	65.8	6,451,200	1,326,174
1923	49.8	6,289,920	1,004,482
1924	58.25	7,967,680	1,339,729
1925	42.99	4,437,440	646,903
1926	47.94	4,214,112	873,253
1927	52.23	4,660,430	1,021,959
1928	50.44	4,693,696	1,000,014
1928[3]	.....	1,530,816	334,523
1929[3]	48.88	1,713,712	358,074

[1] The English penny equals $0.02.
[2] Not including alizarine and synthetic indigo.
[3] Four months.

Recent Rapid Increase in Exports

British exports of finished dyestuffs in 1928 increased in volume by about 25 per cent as compared with the previous year, while those during the first four months of 1929 were 76 per cent greater than in the corresponding period of 1928.

About one-half the exports go to British countries—principally Australia, India, Canada—and the Irish Free State, while the chief foreign customers include Belgium, France, China, the Netherlands, and the United States.

The volume (in pounds) and value, respectively, of British exports of finished dyestuffs follow: In 1913, 5,451,376 pounds, £177,246; 1924, 11,692,352 pounds, £923,933; 1925, 11,666,032 pounds, £847,639; 1926 8,481,424 pounds, £614,112; 1927, 8,694,896 pounds, £658,454; 1928, 11,645,424 pounds, £806,533; first four months 1928, 3,374,896 pounds, £243,805; first four months 1929, 5,948,992 pounds, £322,326.

By volume British exports considerably exceed imports, while as regards value the opposite is the case—indicating that whereas British consumers use the more costly dyes, a surplus for export of the cheaper classes is produced.

Local and British Consumption

The Manchester district is almost the exclusive home of the British cotton textile industry, while the greatest part of the output of rayon and cotton and rayon mixed, piece goods, as well as about one-third of the silk goods, are also produced and finished in the district. It is believed that about 75 per cent of the dyes used in the country are consumed in this territory.

The only means of calculating the home consumption is to add imports to production and deduct exports. In

*From "Commerce Reports," U. S. Department of Commerce.

this manner it is found that the British consumption in 1924 amounted to 29,518,032 pounds, 26,464,810 pounds in 1925, 26,029,612 pounds in 1926, 35,517,214 pounds in 1927, and 40,168,886 pounds in 1928.

The rapid expansion of the rayon industry during 1927 and 1928 is believed to account, in part at least, for the indicated increased consumption, because there has been little improvement in either the domestic or foreign demand for cotton goods.

The depressed condition of British textile industries—particularly cotton—has undoubtedly retarded what would normally have been the domestic demand for dyestuffs. This is obviously shown by cotton piece goods production and export statistics. On the other hand, the question of domestic demand has been of secondary importance to British dye makers, inasmuch as there has been—at least until recently—a larger aggregate demand in the home market than they were capable of supplying, and the chief problem has been to increase production in order to obtain the business from foreign competitors.

At present it is said that Britain is not only capable of supplying its own dye requirements, but will soon be a much stronger competitor in the world's markets.

Trend and Technical Progress of the Industry

All indications during the past two or three years have pointed to the growing popularity of rationalizing British industries, the forming of mergers and amalgamations and entering into international understandings. The dyestuffs industry was included in one of the earliest of these schemes and following the formation of the British Dyestuffs Corporation merger of 1918, this company in turn became a unit of the Imperial Chemical Industries with its world-wide and international ramifications. Thus during a period of eight years, the manufacture of coal-tar dyestuffs has, for all practical purposes, come into the hands of one concern.

British Dyestuffs Production, 1928*

By Trade Commissioner Homer S. Fox, London, and Consul A. R. Thomson, Bradford

The total production of dyestuffs in Great Britain in 1928 amounted to 50,907,080 pounds, representing an increase of more than 11,355,000 pounds or nearly 29 per cent above the corresponding output in 1927, according to compilation of data by the Board of Trade, prepared from returns furnished by the principal British dye makers. The production last year was about five times that of the period immediately preceding the World War. With the exception of 1925-26, when there was a small decline of the British output of dyes largely as a result of the generally depressed conditions of industry, there has been a steady increase in recent years in the total output of dyes in Great Britain, as well as in the range and quality of the products made. The increase recorded last year, however, is the largest in recent years.

The following are comparative figures:

Year	Pounds
Pre-war average	10,000,000
1923	33,000,000
1924	33,242,704
1925	32,693,402
1926	30,297,000
1927	39,551,756
1928	50,907,080

As regards the trend of the colors produced, the increases were mainly taken up in blues and reds, but there was a slight general improvement in respect to every other color. As to types of dyes, the most notable increase was in respect to the production of vat colors (including synthetic indigo), which rose from 8,819,000 pounds in 1927 to 11,287,000 pounds in 1928. Chrome and mordant colors (including alizarine) were increased by 2,000,000 pounds; direct cotton colors, by 1,300,000 pounds; and acid wool colors, by 1,200,000 pounds.

The greater production of British dyes is reflected in the foreign trade figures. Exports of United Kingdom coal tar dyes in 1928 accounted for nearly 23 per cent of the national production. The total export was 11,645,424 pounds, as compared with 8,694,896 in 1927, thus showing a tendency to increase. Imports of finished coal tar dyes into the United Kingdom have not increased at so great a rate as the exports, the figure for 1928 being 4,693,696 pounds, against 4,559,632 pounds in 1927. Nearly three-fourths of the imported dyes came from Germany, with Switzerland and other countries contributing comparatively little.

During the first four months of this year (1929) exports of coal tar dyes have totaled 5,948,992 pounds, as compared with 3,374,896 pounds during the corresponding period of 1928, an increase of 76 per cent. At the same time imports have shown a small increase, from 1,530,816 pounds to 1,713,712 pounds. During the same periods imports of intermediates grew from 45,248 pounds to 55,888 pounds.

A total quantity of 5,030,511 pounds of dyes were licensed for importation in 1928 (as distinct from the actual imports), according to Board of Trade figures. This is equivalent to approximately 10 per cent of production in the same year, and is nearly double the quantity licensed in 1921, since when there has been a fairly steady increase in the quantities licensed for importation under the dyestuffs (import regulation) act. The actual number of licenses granted in 1928 was 7,051, which is about 300 more than in 1927 and about 500 less than the number of applications received. In other words, about 94 per cent of the total number of applications for dyestuff import licenses were granted, those rejected being for goods that, in the opinion of the Dyestuffs Licensing Committee, may be supplied by British makers without disadvantage to the consumer either as to price or quality.

*From a special circular of the Chemical Division, Department of Commerce

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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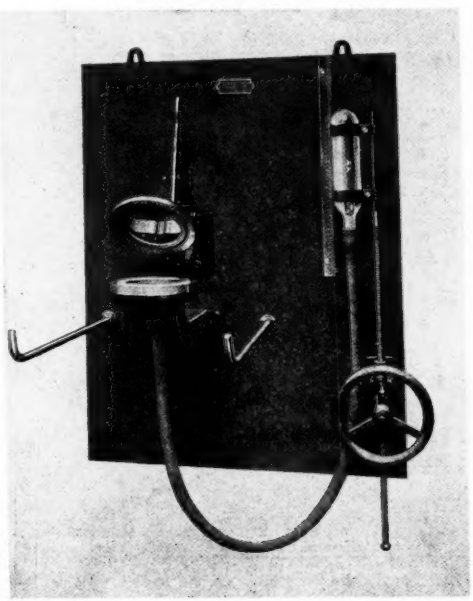
REPORT OF THE SUB-COMMITTEE ON WATERPROOF STANDARDS

THE task of setting up standards to enable us to determine the resistance of materials to water has caused us to make a survey of the work already done along these lines.

Without going into any great amount of detail in so far as describing these tests and the results obtained, it became quite obvious that no general test is known to be in use which is capable of interpreting the results in terms of actual performance.

The commiittee has therefore set itself to the task of undertaking a series of experiments with the object in view of developing tests which will be fairly reliable, duplicable and rapid of performance.

The work so far accomplished has consisted of ex-



perimentation with hundreds of samples of materials, some of which have been subjected to shower tests, and all of which have been subjected to hydrostatic pressure tests. The accompanying photograph is one of a hydrostatic pressure apparatus in use by us. A sample of the material is clamped down over the vertical well. The cylinder to the right, which previously has been filled with water up to the zero mark on the scale, is gradually raised. A reading is taken on the scale, which is graduated in centimeters, at the instant

water is observed coming through the material. The result is reported in centimeters, hydrostatic pressure.

It has been found that materials having a hydrostatic pressure resistance of 17 centimeters are generally accepted as being satisfactory in so far as their shower-resisting properties are concerned. Materials showing a resistance of 50 centimeters are generally accepted as being satisfactory in so far as their rain-resisting properties are concerned. Materials showing a resistance of 50 centimeters for one hour are generally accepted as being waterproof.

Following are excerpts from Humphrey's "Physics of the Air" and from the Smithsonian tables:

From Humphrey's "Physics of the Air"
(Pages 267-8)

Velocity of Fall of Raindrops.—If the diameter of the drop is very small, 0.1 mm. or less, its approximate steady, or terminal, velocity of fall can be computed by Stoke's well-known equation (Phys. & Math. Papers, Vol. III, p. 59):

$$V = \frac{2}{9} g r^2 \frac{O-P}{u}$$

Where V is the velocity in centimeters per second, g is the acceleration in centimeters per second, r is the radius of the drop in centimeters, O is the density of the drop, P is the density of the air and u is its viscosity.

From Smithsonian Tables

Viscosity of air at 0° C. is 173.3 × 10^{-6} c.g.s. units; at 15° C. is 180.7 × 10^{-6} units; at 20.2° C. is 181.2 × 10^{-6} units. (Latter is considered most accurate value.) Density of air is 1.293 grams per liter at 0° C. and 760 mm. of Hg.

The equations of fall in the case of raindrops of average and large sizes, 1 mm. to 5 mm. diameter, are, however, very different and but little more than empirical (see Liznar, Met. Zeit., Vol. XXXI, p. 339, 1914). Several of the more important velocities, and sufficient for approximate interpolations, are given in the table below of precipitation values. The maximum velocity in air of normal density (velocity proportional, nearly, to square root of density) at which the larger drops break up is about 8 meters per second.

Intensity of Precipitation.—The intensity or rate of rainfall varies from zero up to several inches per hour, and, like the strength of the wind, has been popularly divided into several more or less definite grades. Most of these, together with other roughly average values they imply, are given in the accompanying table.

PRECIPITATION VALUES
(Air Density as at 0° C. and 740 Mm. Pressure)

Popular Name	Precipitation intensity, in mm. per hr.	Diameter of drop, in mm.	Velocity of fall, in meters per second.	Milligrams of liquid water per cubic meter of air.	Height of cloud above surface, in meters.
Clear	Zero	..	..	0.0	..
Fog	Trace	0.01	0.003	6.0	0
Mist	0.05	0.1	0.25	55.5	100
Drizzle	0.25	0.2	0.75	92.6	200
Light rain	1.0	0.45	2.0	138.9	600
Moderate rain	4.0	1.0	4.0	277.8	600
Heavy rain	15.0	1.5	5.0	833.3	1,000
Excessive rain	40.0	2.1	6.0	1,852.0	1,200
Cloudburst	100.0	3.0	7.0	5,401.0	1,200
		5.0	8.0		

The size of raindrops, their rate of fall, the amount of rain falling during specified periods, ranging from one minute to twenty-four hours, is being investigated, and a further investigation is now under way for the purpose of trying to establish a relationship between hydrostatic pressure test and conditions existing during rainfall of various degrees.

It is hoped that manufacturers of waterproofed materials, waterproofers and others will submit samples to the committee for test.

The apparatus illustrated is simple, sturdy and capable of testing many fabrics in a short period. It is not difficult to reproduce, as its parts are simple; although, in view of its performance, the cost of the instrument as illustrated will be deemed small by concerns having much testing of this character to do.

This speed of making the test as a matter of practice increases the reliability, for it permits with convenience a large number of tests on the same fabric, thus securing a more representative figure, while the large area of goods exposed to each test furthers this reliability.

The impermeability of fabrics whose interstices are completely filled by water-resisting material to air under various pressures is also the subject of a study by the committee, and it is hoped to give some information on the resistance of fabrics exposed to rain during very high wind pressure. The apparatus employed permits eight readings to be made on the same fabric and thus insures a reliable measurement. A shallow brass tray is provided with a conforming cover made of a brass plate into which ten brass tubes pass; two of these tubes pass halfway down in the tray when the brass plate is used as a cover, and eight of these terminate flush with the flat bottom surface of the cover. A rubber gasket, with ten holes corre-

sponding to the openings and extensions, is cut. One of the tubes, passing through into the tray, is sealed at the lower end and used as a thermometer well. The other tube entering the tray is used as an air inlet. The fabric is laid above the tray under slight tension. The tray is filled with moistened sponge. Air at any measured pressure is passed down into the tray and can pass up through eight openings in the fabric wherever it is permeable. The passage of air is noted by carrying the eight vents into separate beakers of water by means of rubber tubes, the first passage of air through the fabric being indicated by air bubbles in the beaker at the mouth of the rubber tube. This is a rather severe test, but seems to more closely resemble the conditions of a heavy wind with little rain than any method mentioned in the literature. A sufficiently large number of materials have not yet been tested to arrive at a series of graded standards, here as well as for the apparatus earlier described. Association members interested in the adoption of definite criteria and specifications for goods of this character are invited to submit samples for test. These samples should be described as to their general mode of processing and the use for which they are intended.

The members of the Association are urged to regard these methods and standards as merely tentative and in a sense provocative if it will stimulate others closely in touch with this class of goods to suggest other and better standards and tests.

One-Bath Silk Hosiery Dyeing*

By L. J. McGinty
Wiscassett Mills, Albemarle, N. C.

THERE are a good many mistaken ideas concerning the practice of dyeing and degumming stockings in a single bath. This paper aims to rectify as many of these as possible. It does not aim to convince anyone that the method in question is the best one. Perhaps, in view of the diversity of requirements and of local conditions in hosiery mills, there isn't any best method.

The advantages generally attributed to one-bath dyeing are:

1. *Economy.*
2. *A superior finish.*

The disadvantages:

1. *Difficulty of controlling dyes.*
2. *Inferior fastness of dyes.*

As to the advantages, it must be conceded at once that they are quickly forfeited under adverse conditions. They are contingent upon a smoothly functioning dyehouse; the goods must not be kept in the boiling alkaline bath much longer than is necessary to degum them. But this much is very well understood by most hosiery men and it is not the intention here to go into it.

It is rather the two so-called disadvantages that need attention.

The first, the difficulty of controlling dyes, is quite real; but that does not mean, as some believe, that it is a difficulty which cannot be mitigated or overcome. It simply means that to the problems of dyeing previously degummed goods, i. e., 1, of water; 2, of yarns, and 3, of dyes, must be added another, 4, to standardize also the degumming material.

Problem of Dye Control

Briefly, the problem of controlling dyes is the problem of keeping uniform conditions. The would-be variables must be made constants and kept constants as nearly as possible.

Water, the first problem, nearly always merits and rewards special concern. The necessity for softness which has been well-advertised is recognized quickly enough. But the almost equal importance of having a slight uniform alkalinity (neutrality being too hard to maintain) is very often ignored. Yet it is common knowledge that raw water is subject to all sorts of seasonal fluctuations away from neutrality. Dyes, of course, will always keep in line with these changes instead of with a formula.

An alkali reservoir is standard equipment with some softeners. Caustic soda is fed from it into the water, the amounts being governed by tests made at intervals using phenolphthalein and titrating with very dilute sulphuric acid.

The importance of No. 2, the problem of getting a homogeneous supply of mercerized yarns and silk, has been insisted upon often enough not to need especially to be dwelt upon here.

But the third problem, relating to dyes, has had on the whole somewhat skimpy treatment. A great deal more intelligence has been expended in making dyes than in applying them. Yet there are difficulties on the empirical side that no laboratory man need be scornful of. The practical requisites for a perfect dye are so many and so various that perfection recedes to a rather remote hope. Chiefly, a dye should be:

1. Level dyeing.
2. Dischargeable.
3. Unchanged by artificial light.
4. Undisposed to "age" considerably.
5. Thoroughly exhausting.
6. Unaffected by Monel metal.
7. Reasonably fast to washing.
8. Reasonably strong and soluble.

*Paper delivered at the Spring Meeting of the Piedmont Section of the A. A. T. C. C. and read by Prof. A. R. Macormac in Mr. McGinty's absence.

No attempt has been made to recount these in the order of their value because that varies from mill to mill, and no reference is made to price for the obvious reasons that dyes embodying all these characteristics are cheap at any of the current prices, and that the majority of hosiery shades require well under 1% of dye.

A word of explanation may make some of the points clearer:

1. The property of dyeing level is the rule among silk dyes, and the exception among cotton dyes. To dye mercerized cotton tops and feet a uniform shade is a nice problem, and it is complicated in the one-bath method by the presence of alkali tending to drive the cotton dyes on more quickly, and by certain procedures principally concerning temperature, which are dictated by requirements of finishing. Dyes that exhaust rapidly are unsuitable; so are dyes that do not begin exhausting until salt is added, for the exhaustion period of these is also short. The dye should be deposited slowly and steadily over a period of such length that the many surfaces in a batch of hosiery have all a chance to be exposed to it. Since it is necessary to have three such dyes, at least, for purposes of shade-matching, and since they must answer so many other requirements, it follows that a good deal of experimenting is necessary to find a good combination, unless someone else's efforts are made use of.

Dischargeability and Aging

2. Dischargeability is included because black, that dyers' haven, is not popular enough in hosiery to accommodate all the redyes. Certain cotton reds and yellows, and silk blues that would otherwise be satisfactory are disqualified.

3. The effect of artificial light is distinctly pernicious upon many combinations of dyes, because it tends to turn cotton blues and blacks green, and silk blues and blacks red, thus effecting unions which appear shockingly bad and which yet may look good in daylight. There are, of course, dyes that are not so effected, but they are not numerous.

4. The phenomenon of "aging" is a result of artificial drying. When a stocking is boarded all the moisture is dispelled from the dyes, and some of them undergo a very considerable change of tone as they reabsorb it. To compensate, dyers steam their samples, but it is easily possible all the same for dyes that age excessively to deceive. Also, the man who must appraise the boarded work is much perplexed by a variety of dyes aging in all directions. And, too, the dyer who works with these dyes is tempted now and then to depend on aging to do what only an addition of dye can do.

5. A residue of unexhausted dye in a bath is a potential source of trouble. It varies with the length of the bath and with the moisture content of the salt used.

6. Hosiery dyers do not usually have to cope with the action of copper and iron. And dye manufacturers invariably and cheerfully dispose of Monel with the phrase "practically unaffected." But in many instances they are in error—particularly in the case of the catechines, which are reddened in varying degrees, and of most blues and blacks, which are reduced in some manner that seems to be augmented by the presence of alkalinity. The effect is most noticeable when the Monel is new. The extent of the reduction varies with different dye machines, and in some instances varies from time to time in the same machine. The Sulphoncyanine Silk Blacks are notorious in this respect.

Fastness

7. The word "reasonable" as applied to fastness lends itself as usual to as many interpretations as there are points of view. Some women do not think it unreasonable to expect the dyes in their stockings to remain unscathed by boiling soap solutions, and many merchants, being likewise uninterested in the merely technical difficulties of fastness are inclined to take the same view. On the other hand some dyers and dye manufacturers think it no more than reasonable that the stockings should be washed in cold water with neutral soap, and preferably with a little salt in the water. These are the extremes. Most women wash their stockings with kitchen or toilet soap in water that is not too hot to put their hands in, and they are justified in expecting the dyes to hold. Some will not—notably certain silk yellows. These can be distinguished by comparative wash tests.

8. A good deal of latitude can be exercised regarding these last two points. There are not many hosiery dyes that do not dissolve very readily in boiling water, and the question of strength ought not to be consequential except when concerning a choice between dyes in which the other considerations that have been described are about balanced.

Variations

After good dyes have been selected and put to work, there is another difficulty to be met—the variations in shipments from the manufacturer. To accept a lot of a dye that is off in tone or strength is to invite confusion, unless the discrepancy is accurately judged and corrections for it made at once in every formula involved. It is well to order as large quantities as possible and to request the dye company to check them carefully against a mill sample.

Returning to the fourth problem, which is peculiar to

one-bath dyeing—to standardize the degumming material, usually an oil—the best procedure is probably that recommended in the case of dyes: to get the manufacturer to keep a mill sample and try to hold the silicate content of his shipments as close to it as possible. It is easy to make comparative checks in the mill laboratory with the same reagents used to test the water, i. e., phenolphthalein and sulphuric acid.

As to the idea that dyes applied in a degumming bath are not as fast as those applied in a subsequent bath, the writer is skeptical. There is only one fair test—to use the same dyes under the two conditions, and this test reveals no difference.

Some Aspects of Piece Goods Dyeing*

By R. M. Mitchell

Proximity Print Works, Greensboro, N. C.

WHEN Professor Mullin asked me to talk to you on the subject of piece dyeing of cotton goods, I was somewhat at a loss to know how to address you, as it is such a broad field and I realize that many of you here to-night are familiar with this subject. On the other hand, I also realize that in this section of the country there has yet been no such development as there has been in other parts where they have been at work on these probems for many years.

My first definite conclusion was that I would not attempt any technical discourse, as this information can all be obtained from the many works on the subject, but that I would sketch briefly for you some of the changes and progressions that I have seen in a comparatively short period of time. It is a story of constant improvement of dyestuffs, the building up of our American dyestuff industry, higher standards in every way, and, above all, specifically a necessity to produce permanent colors which will stand the ravages of weather and laundry.

Then came my second conclusion and that was that you all would only be bored to hear a lot of past history. With the surely coming development of dyeing and printing in this section, I am sure you will be more interested in the present and future than in the past. In my three years in the South I realize more and more that here is the logical place for development. Only a few years ago a dyer and finisher in Massachusetts told me that his khaki business was a thing of the past because the converter could not afford to pay freight to New England on gray goods and then pay another freight to the West and Southwest; in competition with the converter who bought his gray goods in the South, had them dyed there, and then shipped them direct to his customers. Only last week a Northern friend whom I consider really an expert in printing and dyeing, wrote me that he had one or two opportunities to go South, but he felt that for high-class print and dye novelty work the advantage still lay with the North on account of the nearness to the style centers. Even if the condition does now exist, and I doubt if it does, the near future, I know, will show a radical change and I am so informing him. All of the above to impress on you my belief that some day a large part of the printing and dyeing and finishing will be done in this section and that it behooves us all to watch carefully its development.

My third conclusion came after reading Professor Mullin's letter announcing this meeting, especially in regard to that part referring to this paper. I must really differ with him about being an authority. I have been connected with this business long enough to know that something must be learned every day. Probably I felt I knew the business better 20 years ago than I do now. Anyway, I feel it incumbent to disabuse your minds before going ahead.

A Well-Balanced Dyehouse

In the equipment and working of a piece goods dyehouse, one item stands out. In spite of the changes in methods and materials, there has, in my recollection, been no radical change in the machinery. Practically all piece dyeing is still done on jigs and on continuous machines. Of course, there are minor variations, but the basic principle remains the same. On these two types of machines can be dyed direct colors, basics, diazos, minerals, sulphurs, or vats. A well-balanced dyehouse based on a medium-sized production in various types of dyes ought to contain:

Six jigs, part of them iron if for sulphur colors and part of them wood if for basic colors. Of course, Monel metal or stone jigs are very good but expensive. They should have a plentiful supply of water and steam to save delays between changes and a large outlet to empty them quickly. Much delay in production is frequently caused by such deficiencies.

In addition there should be at least one continuous eight or nine box machine which can be used for many purposes, namely, to wash gray goods for dyeing, to dye sulphur colors, to dye vat colors, to raise mineral shades after padding, to diazotize and develop, etc.

Also, there should be two padders: one, perhaps, connected to a set of cans and the other equipped with a batching arrangement and a reel to pleat into trucks. These padders should be equipped so that the spray system of dyeing can be used or the goods can be run into a small pad box of 5 to 20 gallons capacity.

*A paper delivered at the Spring Meeting of the Piedmont Section of the A. A. T. C. C.

Also one or two water mangles.

This covers the bare machinery requirements. I know, however, of one plant which went extensively into the dyeing of diazo and developed colors in a full range of high shades to be afterwards printed and discharged with vat colors, which method to-day is largely used as the fastest and most practical for dress goods and color ground prints, considering the results obtained in proportion to the cost.

They were equipped with five Rodney-Hunt machines and padded all the direct shades on the padder, batched up and carried to the machines where they were diazotized and developed in rope form with a production of thirty to forty thousand yards a day.

A modern dyehouse must have some simple laboratory equipment to test new dyes offered and also regular shipments received against orders. The dyer should supervise but must not be burdened with this detail. A young graduate chemist from one of our textile schools is valuable for this purpose, and becomes more and more valuable as his experience increases. There should be constant work along this line and the dyer of to-day must be honest and open-minded enough to change and grasp new problems wherever it is proved to him that such changes are of benefit.

Equipment for the Dyer

In addition, a dyer and chemist should have access to the leading periodicals and text-books and should study them, for although the cost seems high, yet frequently ideas can be obtained which pay for the first cost many times.

A dyer of to-day, in addition to his practical knowledge and experience, must have a systematic mind, so that his records of formulas and his filing system of dyeings are correct and of easy access. In jig work, dyed swatches from every roll, and in machine dyeing swatches from every 500 yards ought to be taken, properly marked, and held for a reasonable length of time so that a study of any changes during subsequent operations can be made and a record kept for dyeing of future lots which must be duplicated or be changed.

A separate drug room is very advisable, with a first-class direct-reading set of scales installed. Then a careful, intelligent man should be selected to do all the weighing, and this responsibility put on his shoulders.

It might seem that if the above equipment is provided troubles will not occur. Not at all. In spite of formulas, records, and study, many troubles are ahead unless the operatives are thoroughly impressed with the importance of seemingly insignificant details. The success of jig dyeing is dependent on correct manipulation, correct temperatures, even boiling, thorough stirring on each dye addition, and many other details. In machine dyeing, problems of exhaustion arise, especially in compound shades. It is practically impossible to find three direct or three sulphur dyes which will exhaust at the same rate of speed.

In the direct or substantive colors we have a full selection of shades, and they are easily dyed on jig or padder. Many of them are of excellent fastness to light, but cannot be said to be fast to washing as a class. They are well adapted for sateen-linings, mercerized or plain, with a schreiner finish. They are readily dyed on the spray padder up to speeds of 150 yards per minute. This insures better evenness of shade from the beginning to the end of the run as the problem of exhaustion is avoided. The spray padder is a two-bowl machine and the pad box underneath is not used except to catch any dye liquor which goes through the cloth. The cloth is fed, face up, directly into the nip and the dye solution at a temperature of about 180° F., sprayed on to the cloth just as it enters the nip at a slight downward angle so that the dye will not run back and cause streaks. The spray pipe is so placed that the cloth rubs against the underside, and thus a dam is formed that keeps the dye liquor between the nip and spray pipe. I have seen all direct shades dyed this way up to a navy or seal, although these very dark shades required two runs with a drying in between. Please bear in mind, all the time, that most of the piece dyes now go to the cutting up trade which requires uniformity of shade so that a large number of pieces can be cut up at once without danger of shaded garments. Of course, shade and uniformity is one of the desired goals, but do not think it is always attained.

Special Methods for Various Colors

Jig dyeing of direct colors lends itself to small runs and to sample shades. It is practicable to dye from one piece up to 1,200 yards on a jig and get uniformity from end to end if the color is added carefully in several portions at a fairly low temperature, and then gradually raised to a boil.

Basic dyes are a different problem, as they have practically no affinity for cotton and must be mordanted on by tannin and antimony. The success of basic dyeing depends largely on the mordanting with the tannic acid. It is really best to put the tannin on in the padder with the batching arrangement and then put on the jig for the antimony and dyestuff. This insures an even impregnation from selvage to selvage and overcomes the tendency for dark edges which often occur when the tannin is put on in the jigs. Tartar emetic is the antimony salt usually recommended, but the double fluoride shows

better money value. Also an addition of salt seems to allow of using less quantities of antimony with the same results. The dye is then put on slowly and at a low temperature and then finished at about 180° F. These colors are of great covering powers and are the most brilliant known. Although fairly fast to washing they are not as a class good to light and crocking.

Sulphur colors are already being dyed in large quantities in this section. They are dyed both in jigs and machines. They are all of excellent fastness and largely used for khakis, sand shades, navy, etc. The preparation of goods for sulphur dyes is of great importance, as they are very sensitive to rubs, motes, etc. In other words, I believe that the success of sulphur dyeing rests largely on a proper preparation before dyeing, as well as during it. But there is already so much sulphur dyeing done here that it is not necessary to go further into it.

The use of the diazotized and developed dyestuffs is limited very largely on piece goods to those styles which are to be white discharges or discharges with vat colors, and there is an enormous field for this class of work at present. The diazotizing and developing give results extremely fast to washing, and they, with one or two exceptions, are easily dischargeable. A full line of colors is available, and I know that very large quantities of this class of work are being put through in Northern Print Works for dress goods. By a careful selection of dyes of the better fastness to light, very fast and beautiful combinations can be produced both on cotton and on rayon and cotton mixtures. The cloth is dyed same as the direct colors and then diazotized and developed. This is mostly done on the jigs, but a better way is to pad them and then develop them in continuous machines either in rope or open form. This means greatly increased production at a lower cost.

Comparison of the Vat Dyes

As to the mineral dyes, if any of you are especially interested in the production of extremely fast khakis, sand or Hongkong shades, I would refer you to the very able article by our Mr. Hayes in the American Dyestuff Reporter about three years ago. These shades can be produced on the machinery of which I have spoken, and while it is of advantage in many ways to age the goods after padding and dyeing, and before raising with caustic and soda ash in the continuous machine, it is not absolutely necessary, and I know of three plants which are getting good results without aging, although at probably somewhat additional cost. The theory and the process seem simple until you try it out, and you will run into plenty of mechanical problems which you would not believe could occur. The logical conclusion is to try and work out these fast shades with vat colors.

And this leads us to the class of dyes which are of greatest interest and importance to everybody concerned, from the dyer to the ultimate consumer. These are the so-called vat colors, and as a class are the fastest range of colors yet produced. Germany controlled this production for years, and it was not until the World War that the United States realized this part of the industry must be developed. Enormous amounts of money and time were spent in research, and to-day our manufacturers can supply the dyers with a complete line, either of Indigoids or Anthracene dyes, and ought by every right to receive our fullest support and co-operation.

There are now several different classes of vat colors, the Indigoids, such as the Sulfanthrenes, the Cibas, the Hydrons; the Anthracenes, such as Ponsols, Indanthrenes, Carbanthrenes, and Anthrenes; and third, the Indigosols, which so far are not made in this country.

As a class the Anthracenes are the most permanent, while the others are a close second. The Indigosols are of special interest, as they are water soluble colors and can be padded the same as direct colors, dried and developed to shade. They are converted vat colors, mostly Indigoids, and the ease of application makes them worthy of note as they represent a definite indication of progress. The European manufacturer is now working on the problem of converting the Anthracenes into water-soluble dyeing colors, and already several of them are available. I believe that this highly important problem will be worked out satisfactorily, and when such a line of Anthracene colors becomes available at a reasonable cost it will revolutionize the dyeing of fast colors.

The two most used methods of application of vats in piece dye work are the padding method and the so-called padder-jig method.

The latter, I believe, is still the most used for medium and dark shades. The paste colors are used and are padded on unreduced, then rolled up off the padder and taken to the jig, reduced, and oxidized. The dyes in powder form I do not consider suitable for this method as specky dyeings are often the result. On the other hand, there is the problem of evaporation from a barrel of opened paste color, and a consequent change of strength. Also, sometimes a drying out on the sides of the barrel of color which then necessitates grinding in the color mill. These difficulties can, of course, be overcome by a careful check-up of the weights each time color paste is taken out, and the necessary amount of water added to bring to standard color strength. One plant devised the scheme of building an air-tight storeroom for keeping opened barrels of paste colors, and a large humidifier kept the air so well saturated that no evaporation and drying out could take place. Of course, the paste color in the barrel must be thoroughly stirred

whenever used. The pad-jig method is a most particular one, as troubles with specks, foam, and dark edges are common, but when once mastered the results are very fine, and I still believe the shades are slightly brighter, the penetration slightly better with a better fastness to rubbing than with the padding method.

The Padding Method for Vats

The most logical way, however, and the method which is most vital to dyers to-day is the padding method. Powder dyestuffs can be readily used, as the color is padded on reduced and one can be sure of uniformity and strength of dye. The cloth is padded with a heavy set and passes directly into a continuous eight or nine box machine for the development and soaping.

So far as I can determine, this process is coming into general use for medium and light weight mercerized cloths, and although there are many claims that heavy goods down to two yards can be dyed successfully this way, I have not been able to prove it. I do know of several companies doing a large amount of research work along this line, and undoubtedly the problem will be solved only by a very close co-operation among the dyers, the manufacturers and the machinery builders. I do believe, up to date, it is the ultimate goal desired by the fast color dyers.

Considering the enormous strides made by the American chemist and manufacturer in the development of these fast dyes, it seems almost as if they had gone as far as they can for some time to come. One manufacturer made the statement to me that many of these dyes would probably be the same twenty years from now, or, in other words, the manufacturer had about reached the end of his rope. Of course, there is the exception of the Indigosols which are, however, really a further refinement. He thinks that now is the time for the engineer to devise new means to use these colors. I have already pointed out that the basic principles of the machinery used have been the same for many years. Is not the time now at hand when the dyer, the manufacturer and the engineer and builder of machines must co-operate to work out new methods of application so that cotton goods, either in the piece or in garments, can be sold to the consumer with a very strong guarantee of wearing qualities? I do not pretend to give you any solution to the problem, but it is a vital one, and it is yours as much as anybody's in the surely coming development of this line of work in the South.

ANNUAL OUTING OF THE NEW YORK SECTION

THE annual outing of the New York Section was held at the Elmwood Country Club, Paterson, N. J., Friday, July 19. Although the morning was cloudy, with a little rain, there were quite a number for lunch at 1 o'clock.

Golf was the main sport indulged in during the day, there being several prizes up for competition. After a very spirited contest the results were tabulated.

Mr. Brewer, who had low gross, received a beautiful cup which was donated by our Chairman, Mr. Kingsbury.

The low net was a tie between Phillip H. Stott and Mr. Brewer. They will play this off at some future date. The cup for this event has been presented by the American Dyestuff Reporter and has to be won three times before obtaining permanent position. As yet it has not been won twice, so there still remains a bit of competition for this prize.

The visitors' prize was captured by Mr. Scott, of the Newport Chemical Company.

About forty of the members remained for dinner, which was served at 7 o'clock in the clubhouse. A very happy evening was enjoyed by those present.

W. H. Wingate, *Secretary.*

OUTING OF THE NORTHERN NEW ENGLAND SECTION

Ex-Secretary Hadley Presented with Appreciative Token

THE Northern New England Section held its annual outing at the Merrimack Valley Country Club in Methuen, Mass., on Friday, June 14. Despite threatening weather over a hundred members and guests turned out.

In the golf tourney Woodward Allen won the President's Trophy with a gross of 86. John Dalton and Michael Lane tied for best net score, with the prize to Dalton on the toss. Of the guests M. P. Graham turned in the best gross and Hugh Ross the best net. George Linberg drove some 290 yards uphill in the distance contest. David Searle made the most sevens, while William Butler maintained his position on the pinnacle of fame with gross of only 158, through modesty of certain members who refrained from competition.

The Chairman's Trophy for tennis singles went to Dr. Walter Scott, and the honors in doubles to the Chairman himself in company with Dr. Rupp.

At the dinner the first Secretary of the Association, who retired last December, was overwhelmed with surprise at the presentation by Dr. Olney of a watch in-

Snapped at the New England Section's Outing

1. Professor Olney about to toss a ringer. John Skinkle gazes yonder.
2. Secretary Alex. Morrison saying "Shoot!" to the cameraman.
3. Past-Secretary Hadley watches the quoit players.
4. Dr. Walter M. Scott and William D. Appel in an untechnical mood.
5. Kings of the court. The man in the hat looks like Alan Claflin.
6. William H. Cady tests his fastness to sunlight.
7. Walter H. Zillessen poses for photographer who looks just like him.

scribed, "Presented to Walter Eastman Hadley by his fellow members of the American Association of Textile Chemists and Colorists in appreciation of his seven years of service as Secretary." The plan initiated at the annual meeting received such generous indorsement as to make possible an additional gift of one hundred dollars in gold.

The officers elected by the section for next season are as follows: William H. Cady, chairman; Harold C. Chapin, secretary; John H. Grady, treasurer, and Thomas J. Biery, Frank L. McCool, Henry D. Grimes and Walter F. Haskell members of Sectional Committee.

H. C. CHAPIN, *Secretary.*

The Dyeing and Finishing of Textiles Containing Celanese Brand Yarns*

By JOHN P. HOLMES
Celanese Corporation of America

I AM to discuss with you a subject which in a comparatively short while has become of tremendous importance to the textile industry. However, in the short time allotted me, dealing with a subject so broad as the dyeing and finishing of textiles containing Celanese I shall be able to discuss only such phases of this subject as I deem most important or essential.

First, in order to get a clearer conception of the subject, let us briefly see how Celanese differs from the other synthetic textile fibers. All types of synthetic textile fibers may be divided into two general classifications, namely, regenerated cellulose and cellulose acetate. Synthetic textile fibers manufactured by the viscose, cuprammonium and pyroxylin or Chardonnet processes begin with a cellulose base in their preparation, and in each case, after being suitably treated, are brought into a solution by means of a suitable solvent and from this solution the fiber is spun. Finally, in the operations of washing, denitrating and bleaching, all solvents and foreign substances are removed, thus leaving the resultant finished fiber almost pure cellulose. On the other hand, in the case of Celanese, which is manufactured by the cellulose acetate process, a cellulose acetate derivative is the final product, thus differing in composition from the cellulose base used at the beginning.

As would be expected from the variations above noted, these two varieties of synthetic textile fibers show marked differences from each other in both physical and chemical properties. Celanese is very different from the regenerated types of synthetic textile fibers and from the natural textile fibers in its reaction toward dyestuffs. Celanese is resistant to and practically unaffected when treated with most of the dyestuffs generally used. As a result, an entirely new group of dyes, with their own methods of application, were developed before Celanese could be successfully dyed. This led to the final development of a series of colloidally dispersed dyestuffs known as the "SRA" or Celanese dyes. In the process of manufacturing these dispersion colors, the comparatively water-insoluble amino anthraquinone or vat bases are passed through a colloidal mill and dissolved in sulpho-ricinoleic acid (from which the SRA colors derived their name). These colors form a highly dispersed colloidal solution when added to a soapy or sulphonated castor oil dye bath.

John P. Holmes

DYEING VARIOUS TYPES OF FABRICS

Before dyeing woven fabrics containing Celanese, it is necessary that they be wet-out or desized. The sizing used for all-Celanese fabrics is easily removed by running the goods at 180° F. in a bath containing neutral soap and sulphonated castor oil. In Celanese mixed fabrics containing rayon or cotton warps it is necessary to desize with an animal or vegetable diastase in order to convert the insoluble starches into soluble sugars. However, if these warps are only slightly sized, the soap and sulphonated castor oil wetting-out bath will be sufficient.

Before dyeing knitted fabrics containing Celanese, it is necessary to clean the goods thoroughly, using neutral soap or sulphonated castor oil and soda ash in order to remove any wool grease or mineral oils. Wool grease and mineral oils act as mordants for SRA colors; therefore, any oil spots left in the goods have a great affinity for SRA colors and result in badly spotted goods.

*A paper delivered at the Spring Meeting of the Piedmont Section of the A. A. T. C. C.

Textiles containing Celanese are dyed at a temperature not exceeding 180° to 185° F. in a bath containing either neutral soap or sulphonated castor oil and soda ash. Precautions must be taken to see that the dye bath does not exceed 180° to 185° F. If Celanese is dyed at temperatures higher than 190° F., then the yarn is delustered, and the higher the temperature above 190° F. the greater the delustering. The soap and sulphonated castor oil used in the dye bath keep the SRA colors in a highly dispersed colloidal solution. Where dyeings are made in hard water, it is necessary to use soda ash in conjunction with sulphonated castor oil in place of neutral soap.

Bleaching Precautions

Textiles containing Celanese can easily be bleached with chlorine, hydrogen peroxide or sodium peroxide without affecting the luster or strength of the Celanese. The "chemic" or bleach bath should be as nearly neutral as possible or only slightly on the alkaline side. In order that the Celanese will maintain its cross-dyeing properties and other distinctive qualities it is necessary that caustic alkalies be used in very small percentages or excluded as nearly as possible from the finishing process through which the goods pass that contain Celanese.

Textiles containing Celanese, cotton and rayon can be dyed in one bath to produce effects in which the Celanese, cotton and rayon are dyed union or contrasting shades. Also the cotton and rayon may be dyed leaving the Celanese white or vice versa. Where cotton, rayon and Celanese are to be dyed contrasting shades in one bath, it is advisable first to dye the cotton and rayon, exhausting the cotton colors with salt, and then dye the Celanese. By following this procedure the cotton and rayon will be dyed much more level and the staining from the SRA colors will be practically negligible The staining from the SRA colors can be greatly reduced if the Celanese colors are added at intervals in small portions. However, practically all the staining on the cotton and rayon can easily be removed by rinsing the material in a warm bath containing a small percentage of neutral soap and soda ash.

All SRA colors, whether in paste or powder form, should be dissolved at the boil in a solution of neutral soap and sulphonated castor oil. This dissolved dyestuff should then be strained before being added to the dye bath.

Hosiery Degumming

Celanese is also used in fabrics in conjunction with natural silk, rayon and cotton. Where only a comparatively small amount of natural silk is present in the hosiery or woven fabric, the natural silk can be completely degummed in the dye bath during the dyeing operation of the Celanese, cotton and rayon at 180° to 185° F., without delustering the Celanese. However, where the percentage of natural silk present in the fabric is large, it is necessary to degum the silk as a separate operation before cross-dyeing the fabric. Different formulae have been developed to suit each individual condition. Fabrics containing Celanese, cotton, rayon and natural silk can be cross-dyed in three color effects. These three color effects are dyed either in one dye bath or two-bath operations, depending on the effects desired.

Hosiery has constantly been developing toward more elaborate designs, and for the purpose of obtaining cross-dyed effects in these designs, Celanese is being extensively used in conjunction with natural silk, wool, rayon and cotton. In most of the better class of fancy hosiery and for certain operations in the cheaper styles it is advantageous for a hosiery mill making multi-colored hosiery to obtain these effects by cross-dyeing rather than by using dyed yarns.

The cross-dyeing of Celanese in conjunction with other textile fibers is becoming more and more popular in fancy hosiery. The reasons for this are self-evident. By cross-dyeing instead of knitting from dyed yarns you eliminate the necessity of carrying large stocks of dyed yarns. It is practically impossible when knitting from dyed yarns not to accumulate odd lots of dyed yarns which cannot be disposed of profitably. It is not necessary to carry such large stocks of yarn and hosiery if the hose are knitted from natural yarns instead of dyed yarns due to the fact that unfinished goods can be quickly cross-dyed in the exact color combinations desired. Thus if the yarn and hosiery stocks can be reduced there will be a saving not only in capital and interest charges necessary for carrying these additional stocks, but also in the investment in buildings necessary for storing these stocks. The actual manufacturing costs are considerably less for hosiery knit from natural yarns.

It is not difficult to dye and finish textiles containing Celanese. It merely calls for special formulae, and now that these formulae are available this type of dyeing can easily be accomplished. The Celanese Corporation of America maintains a large staff of technical men whose services are available for those who desire to make use of them for any purpose whatsoever connected with the dyeing and finishing of Celanese.

If you have any questions to ask at this time with reference to the dyeing and finishing of textiles containing Celanese brand yarns or with reference to any of the samples I have on display here, I shall be glad to try to answer them.

Notice

Members should hereafter send their changes of address to the Secretary, Alex Morrison, American Woolen Company, Andover, Mass., instead of to the AMERICAN DYESTUFF REPORTER. A copy of the old address should be sent with the new, and to prevent the loss of an issue of the REPORTER the Secretary should be notified as soon as possible.

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AMERICAN
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Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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THE PRICE OF THE PERFECT DYE

IS there such a thing as the ideal dye? Before any dye may be called ideal it is necessary to consider the purpose for which it will be used. If a dye meets the requirements of that purpose nothing else should matter. "But what about the price," somebody will exclaim, "does that not matter?"

Well, what about the price? Suppose the question were put frankly to a dyestuff manufacturer. He would most likely say the price is insignificant if the dye that you order meets your purpose better than any other color that you know of. But if we were a skeptical dyer we might still be unconvinced. After all, we might say, the dye manufacturer can dismiss price with a shrug, because he is selling the dye, not buying it. The price will not bother him if it is high enough to cover his profit and low enough to meet a competitor's price.

Suppose, therefore, we consult a dyer on this question of the ideal dye and its price. We need go no farther than the Proceedings in this issue, where we find a paper on hosiery dyeing by L. J. McGinty. The author lists eight properties of the perfect color, and then says:

> No reference is made to price, for the obvious reasons that dyes embodying all these characteristics are cheap at any of the current prices, and that the majority of hosiery shades will require well under 1 per cent of the dye.

That answers the question. The price of the dye *is* a small matter when a few ounces will achieve the right results. Buying dyestuffs is, from this aspect, largely a practice of selecting the best color for the work. Mr. McGinty, we may be sure, believes that a mill is not buying merely a few pounds of colored powder; it is buying certain desirable results. It is buying the *properties* of the dyestuff—the properties that make it the ideal dye for the purpose. But these properties are not merely bought and used in processing; some of them actually go into the goods that are processed; some of the properties will go into the hosiery and will be sold as part of the hosiery. In fact, these very properties will help to sell the goods, just as lack of them will cause the hosiery to be rejected in favor of a competing brand. Furthermore, the cost of the dye shrinks out of sight when it is compared to the price received for the finished hosiery, a price based on the "feel" and fastness and level shade of the hose.

Stated so plainly, this seems like a very obvious truth such as we might find in a kindergarten primer of dyeing. Even Mr. McGinty alludes to the "obvious reasons" why he makes no reference to price. But apparently it is not so obvious, for dyes are still being selected and ordered on the basis of price.

With a growing market for fast-color merchandise, colors are frequently chosen and graded mainly for their fastness properties. The wisdom of this policy has been widely advertised, and some analytical minds have made a study of fast colors on the basis of their *cost per yard of fabric*. In a very recent article G. T. Metcalf, of the Franklin Process Company, says:

> When the difference between the cost of the fastest colors and ordinary direct colors is reduced to the basis of cost per yard of fabrics, the difference is far from formidable. Certainly cost per yard is the only fair basis on which to decide the issue. . . .
>
> There is very little question but what the public in its present frame of mind will pay the comparatively small advance in price that the use of the fastest colors makes necessary.

While Mr. Metcalf talks about prices and costs, it is quite clear that he, too, believes in buying dyestuffs for their properties—in this case for their fastness. Cost per yard may, as he claims, be the only fair basis on which to decide the question whether or not the public will pay for the faster colors. But cost per yard is not the only fair basis for selecting the dyestuffs. No mill is playing fair to the reputation of its goods unless it orders dyes solely for their properties; the cost per yard will in any case be small.

The dyer is not to blame in every mill where dyes are bought on price. He may firmly believe that dyes should be chosen for their properties, with the special needs of the mill kept always in mind. He may have learned after years of experience that dyes which are ideal for his purpose are cheap at any price. But often the dyer has no voice in the buying of dyestuffs. Frequently he must select his shades from a range of dyes that have been ordered chiefly because their prices help to keep down expenses. But if these colors lack the properties which will sell that mill's goods in open competition with similar merchandise, how much is being saved?

The dyer may understand this penny-wise situation and yet feel that he has no right to criticize the policy. It sometimes requires courage for a dyer to take issue with his employers on a question involving the price of supplies. For if he becomes arrogant in voicing his opinion on the subject the mill may suddenly decide to save money in another way. On the other hand, the dyer often has a real case on his side; and if he can state his case for the ideal dye and convince his superintendent that some dyestuff properties are priceless because of their direct influence on sales, he may earn the commendation of those higher up.

Whenever a dyer discovers that his mill is sacrificing sales qualities to save a few pennies on dyestuffs, it would seem to us well worth any risk for that dyer to disclose the fallacy of such a practice with an argument like that used in Mr. McGinty's paper.

WHAT IS FAST WITHOUT A STANDARD?

"ACCURACY" is the name of the monthly bulletin issued by the Better Business Bureau of New York City; and a very appropriate name it is, for the object of this bureau is to maintain "fair play in the representation of merchandise, to build integrity in advertising and selling."

The current issue of "Accuracy" carries an item about two Brooklyn department stores that advertised theatrical gauze at the same time. Both stores stated that the material was "sunfast," and one of them added that it was washable. The ability of this material to withstand sun and water was questioned. One store acknowledged error in the claims, and said it would be discontinued. The other was of the opinion that the material was both sunfast and washable. The Bureau had the fabric tested. It was found neither fast to sunlight nor to washing; and then the second store admitted its error.

Here is interesting evidence that the practice of labeling fabrics as to fastness is being controlled more rigidly every day. Control of this nature has its dangers, however. An organization like the Better Business Bureau cannot presume to judge fastness accurately unless its laboratory tests are based on some definite standards. These standards should also be acceptable to every factor in the textile trade—to the converters, to the retailers, to the public, to the laundries and dry-cleaners; and they should be standards that can be maintained by manufacturers who guarantee fastness. No set of standards meeting these qualifications can ever be established without a great deal of technical research by chemists who know how to test color fastness in textiles.

The relation between this research on fastness tests and the sales policy of retail stores is clearly becoming a more direct relation. This has increased the need for understanding and co-operation among all those who make, distribute or buy textiles. We know that understanding and co-operation are words worn blunt, but in any scheme of standardization they should be words packed with meaning if the scheme is to succeed. No progress can possibly be made if each group insists upon working out its own fastness standards in order to control the particular branch of the trade with which it deals.

When fabrics leave the mill bearing labels that make claims for fastness, those claims should be stated in terms which are understood by all who will handle the fabrics on their way to the ultimate consumer. And even after fabrics reach the public their qualities must be known to the laundries and the cleaners, for these groups will maintain those qualities during the life of the garment. But so long as each group is free to interpret the language of the fastness claims in a different way, there is bound to be continual bickering and misunderstanding; somebody will always lose in the settlement of damage claims on returned goods, and too frequently the loser is not the party at fault.

Constant research that aims toward a generally accepted system of standards does not seem at all futile when we consider the ills that such a system will cure.

DISAPPOINTED PESSIMISTS

CONFIDENCE and optimism in the business outlook prevail, according to the report of the National City Bank of New York covering economic conditions for the past six months. The high rate of business activity has been well maintained through July, and it can now be definitely seen, says this authority, that there will be no midsummer recession. The pessimists who have been fearing a major reaction have had to postpone still further the fulfillment of their predictions, even though it be granted that some slowing down may be expected eventually, following such an extended period of unusual activity.

Wholesale distribution of commodities is in large volume; warm-weather goods have been selling actively and retail demands for the general run of merchandise is at least satisfactory, with no more irregularity than is normally found. Production in the steel industry is still running close to capacity, while other basic industries are continuing the new high production records established in the first half year. "No serious accumulation of inventories has come to our attention," states the National City Bank in its review.

"The textile markets reflect this stimulus in more vigorous preparations for fall trade," says R. G. Dun & Co., "and current distribution of seasonable merchandise continues to gain impetus from the prevailing high temperatures."

Thus all evils have their compensatory benefits. The sun that has burned lawns brown and beat the starch out of collars and shirts and made work almost unbearable has also moved tons of bathing suits from retail shelves, and so yarn for tons more must be processed and dyed and knitted.

EXTRACTORIALS

The real chemist is not a salesman. By that sign alone you can tell him from the "wizard." His work saves money in business, but he seldom talks about money—it is the work that interests him.—*Arthur R. Maas, in "Nation's Business."*

We have passed from the age when sentimental value had much to do with purchase of clothing. We do not greatly care whether a silkworm in China or a chemist in Cleveland is the author of our ties or dresses.—*Silicate P's & Q's.*

The chemist is of the most obstinate and stubborn class of men. In the textile laboratory, in the dye works, in the knitting rooms, in the weaving sheds or in any other place, give the chemists the line that is needed and they will work until they are galled by the collar, like a thoroughbred horse set to pull a heavy load. The chemist can do wonders when the management is convinced that he is doing good work and lets him know that it is known. —*Fred. Grove-Palmer.*

Laundrymen have made a study of textile manufacturing. Frankly, we would be interested to know just how many textile manufacturers have made as thorough a study of laundries.—*The Laundry Standard.*

There seems to be a reluctance on the part of manufacturers of textiles to take advantage of fundamental scientific knowledge.—*Dr. W. F. Edwards of the U. S. Testing Company.*

The brains of some dyers are rusty from inactivity, but they would operate more effectively if they appreciated that an increased salary lubrication awaited their successful attempts to get their wheezy old mental machinery in operation.—*Textile Colorist.*

The poundage of raw silk for the world is estimated to be 100 million pounds, whereas the United States alone will produce an excess of 125 million pounds of rayon in 1929, and the world's production of the chemical fiber tops 300 million pounds or three times that of silk.—*Rayon.*

The European cartel is slowly developing strength and mastering the overpowering political, racial and traditional attitudes which hamper it tremendously. It is slowly conquering one obstacle after another, even though negotiations appear to break down and a stalemate results occasionally for a year or two.—*J. George Frederick, in New York Herald Tribune.*

SENATE COMPLETES SECOND HEARINGS ON DYE TARIFF RATES

Valuation Debated by Split Committee

THE glare of Senatorial scrutiny fell upon Schedule I of the Smoot-Hawley Tariff Bill, the schedule covering chemical products, during the week of July 21, and for more than two days an aimless discussion of the dye paragraphs and their special valuation basis held the center of the stage at the hearings of the Senate Committee on Finance. From these hearings nothing more developed than a spasm of sentiment against the American valuation plan and some idle speculation as to whether the rates on dyestuffs were in danger of revision. The flexible provisions of the tariff also came in for a share of criticism, a fact of interest to the dye and chemical industry because under the new tariff, as written by the House, the paragraphs covering coal tar dyes, No. 27 and 28, will enjoy the benefits of the flexible provisions.

Recent developments in the Senate's review of the tariff, or more properly those developments which are of special interest to the American dye industry, were as follows:

On July 19 a statement from Senator Simmons, Democrat of North Carolina, outlined the views of the minority party on the tariff. This Senator stated that the chief basis for his party's opposition to the pending bill (H. R. 2667) are certain administrative provisions, and he then proceeded to enumerate them, saying that they will be opposed by the minority. These provisions are the flexible provision, the House change in the law which would permit the President to change the basis of valuation, and the House amendment which transfers appeals from the Court of Customs Appeals to the Secretary of the Treasury.

A few days later the Senate Committee on Finance, which is the committee now holding hearings on the tariff, ordered the Tariff Commission to supply them with a list of commodities manufactured in America and imported in quantities less than 10 per cent of domestic consumption. The reason for this request was not specified, but it was regarded in some quarters as casting some uncertainty upon the rates in some schedules. On July 22 the committee opened its hearings on Schedule I, covering chemicals, oils and paints, but on this day no marked progress was made in the discussion of these articles.

But on July 23 the dye paragraphs of the tariff were made the brunt of an attack on American valuation, and the debates that followed split the Republican ranks on this issue. It became evident that all the Republican members of the committee are not in accord over the retention of American valuation for Paragraphs 27 and 28 covering coal tar products. It was even asserted by some authorities that Senator Smoot, one of the fathers of the new tariff measure, is supporting the opposition to the American selling price plan. The committee finally

agreed, however, not to disturb the basis of valuation. The committee, it was explained, is still waiting for certain information requested of the Tariff Commission and the Department of Treasury. Senator Reed has requested the Tariff Commission specifically for a scale of ad valorem rates based on United States valuation as defined in the 1922 act, showing how these rates will compare with the percentages in the bill now applied to foreign valuation.

The majority members of the Committee on Finance completed their consideration of the chemical and dye schedules July 24, and on that day it was announced by Senator Smoot (Rep.) of Utah, chairman of the committee, that rate changes now being made by the committee majority are tentative and that final decision on figures to be reported to the Senate will not be made until each schedule can be reviewed and the changes voted on by the Republican members.

It is believed that the flexible provision will also be the subject of a concerted attack waged by Progressive Republicans and Democrats. This provision was somewhat broadened in the House draft of the tariff bill. The dyestuff paragraphs, made subject to these provisions for the first time in the new measure, will probably be one of the features discussed in this connection.

Politically the Senate's tariff committee is so torn into opposing factions that no safe predictions can be made as to the nature of the changes which will finally be written into the Hawley-Smoot measure. Several Republican members are aligned with the Democratic minority against certain features of the bill, but it is also pointed out that these Republicans, like some low-tariff Democrats, cannot act without regard for adherents who seek higher protection under the pending bill.

DYED WITH CIBACETE COLORS

The Society of Chemical Industry of Basle has recently issued an attractive sample card, No. 712, containing twenty type dyeings in various shades and twenty-four combination dyeings, processed with the Cibacete dyestuffs on acetate rayon-satin goods.

The steeping, bleaching and dyeing processes are explained in detail in the text of the card, and attention is drawn to the claim that the powder dyes in this series possess better emulsifying capabilities than the corresponding paste brands. The Cibacete powder colors are stirred into a paste in water of 30° C. and the resultant emulsion added to the dye bath. The Cibacete-diazo colors are diazotized with nitrite and hydrochloric acid following the dyeing and are then developed with beta-oxynaphthoic acid.

In a fastness tabulation in this card the light, wash, water and cross-dye fastness of the Cibacete dyestuffs is compiled, also the equalizing and reserving capabilities for cotton, wool and silk. It is claimed that all Cibacete dyes are overdye fast in the neutral Glauber salt bath and possess excellent light fastness.

RECENT LITERATURE

Rayon Manufacture

Artificial Silk. By Dr. F. Reinthaler. Translated from the German by F. M. Rowe, D. Sc. (Revised and enlarged.) Pages XII + 276, illustrations 136. D. Van Nostrand & Co. Price $7.50.

The present edition, which has been extensively revised and enlarged through the collaboration of the author and translator, is the most complete book concerning rayon that has yet been published in English. While it may not enter into details as much as certain other publications, it covers the subject as a whole more completely and gives as much reliable detail as could be expected concerning an industry which has been developed under such secrecy and is still so dependent for its competitive existence upon eternal vigilance and tenacious persistence respecting research work.

The pages of the book are about equally divided between descriptions of the processes of producing the four common types of manufactured organic fibers on the one hand and its properties, including methods of detection, uses, and its economic status in the textile industry on the other. The value of the book is greatly enhanced by numerous and well-chosen illustrations; the photomicrographs are of a high degree of excellence.

The title is perhaps unfortunate for a book so thoroughly up to date, in that it conveys to the American reader the impression of an older book, the term artificial silk having been more or less obsolete in the United States for some time, and, if we are correctly informed, rapidly becoming so in Great Britain.

Every student, manufacturer, and extensive user of rayon should have this book in his library for study and reference. L. A. Olney.

The Full-Fashioned Hosiery Industry. By John Nash McCullaugh. 160 pages. Illustrated. Howes Publishing Company. $10.00.

A complete uniform cost system especially devised for manufacturers of full-fashioned hosiery is outlined in detail in this book.

The author, managing director of the National Association of Hosiery and Underwear Manufacturers, has prepared the first work of its kind available to full-fashioned hosiery mills. The book presents in 160 pages a cost system applicable to both large and small mills, and is thoroughly practical. "Common sense dictates," the author states, "that more money must not be spent in

installing and maintaining a cost system than will be returned in the use of that system."

Briefly describing the fundamental principles of a cost system, the book proceeds to a thorough discussion of the methods it recommends for full-fashioned plants. It analyzes in detail all costs of all departments of a mill, and gives specific recommendations for the costing of goods in such a way that the manufacturer possesses complete information as to how much money he is actually spending on each department, the cost of each number he is making, in detail, and what his profit on each number really amounts to.

That the author handles his subject without unnecessarily soft gloves is indicated by the following excerpt from his opening chapter:

"Unquestionably the day of high prices and wide margins of profit for the full-fashioned hosiery industry has passed. In fact, the last four or five years have witnessed a marked decline in the average price of full-fashioned hosiery offered for sale. This has been brought about by a demand upon the part of the ultimate consumer for lower-priced merchandise, and by the entry of many new manufacturers into the full-fashioned field.

"That the effect of both these factors will add greatly to the intensity of future competition cannot be questioned; the necessity of adequate cost and control information is and will continue to be of major importance.

"Although we do not wish to depreciate the effect of personal observation on the part of the executive, the mill superintendent or the foreman, many instances have arisen, and many more will arise, where the tell-tale finger of accurate cost points to specific inefficiencies in existing methods in a way which cannot be duplicated by mere observation."

There are five main chapter headings in "The Full-Fashioned Hosiery Industry." These are: Fundamental Principles of a Cost System; Analysis of the Labor and Expense Costs; Analysis of Material Costs; Development of the Final Style Cost; and Tying the Cost System Into the General Books.

An idea of the thorough treatment given in the book may be obtained from the following list of sub-headings in its second chapter, entitled "Analysis of the Labor and Expense Costs:

"Subdivision of the mill into its proper departments; definition of each classification of departments—contributory, productive, selling and administrative; the payroll summary; the expense summary; the fixed charge summary; the labor and expense analysis; and the variations due to abnormal or subnormal direct labor and manufacturing expense."

The new book is profusely illustrated. Ten full-page charts are reproduced showing the romantic growth of the industry during recent years, and there are approximately 60 pages of illustrations of tables and forms which explain and simplify the text. These tables and forms are the work of Miller, Franklin, Basset & Co., New York, industrial engineers.

The book is dedicated to Ferdinand Thun, secretary and treasurer of the Textile Machine Works, Reading, Pa.

"The Full-Fashioned Hosiery Industry" will be sent without charge to every member of the National Association of Hosiery and Underwear Manufacturers requesting it. It is offered for sale exclusively by the Howes Publishing Company.

TO STUDY RUSSIA'S TEXTILE MILLS

A special commission of four American textile machinery experts has arrived in Russia to devote four months to an investigation of that country's textile industry. The party includes William Woosnam, textile engineer of the textile machinery department of B. F. Perkins & Son, Inc., Holyoke, Mass.

The commission was selected by a prominent firm of American engineers at the request of the Russian Government, with the idea of having made a complete investigation of methods, processing costs and equipment, with the view of introducing improvements in accordance with American practice. The Russian Government is planning modifications and extensions, and will rely largely upon the advice and recommendations of the commission.

Mr. Woosnam, who resides in Holyoke, has been identified with the textile industry and with the manufacture of textile machinery for a number of years.

NEW BLEACHING PRODUCT AND PROCESS

Patents were recently granted to United Chemical Products Company, of Jersey City, N. J., on a product and process developed in its laboratory for kier boiling and bleaching in one operation. According to the statement of the manufacturer this invention relates to an improved and simplified process for cleaning, scouring, bleaching and color-fixing cotton raw stock, yarns, warps, piece goods, linen, wool, silk and other fibrous and textile materials. The patents also cover a bleaching composition known as Bleachall for use in practising the process.

One of the objects of this new process, it is further stated, is to simplify the known treating processes, to minimize the multiplicity of steps and to provide a process which can be practised as a single step even in iron kiers and without any deleterious or objectionable effects on the resulting goods.

The invention particularly features what is described as an improved process constituting a finish for woven fabrics, such as Turkish towels, which include both white areas to be bleached and colored areas or bands to be rendered brilliant and in clear contrast to the white area. According to the description, this phase of the process is attained by subjecting the goods while in an iron kier, if desired, to a single boiling treatment and in the presence of reagents capable of effecting the desired bleach-

ing and color setting effect, but incapable of forming iron rust with the kier. There takes place a combined reducing and oxidizing reaction, it is claimed, capable of bleaching and setting colors and at the same time composed to form incidentally a coating to prevent the formation of rust with the iron kier.

FEDERAL FUR DYEING REORGANIZES

The business of the Federal Fur Dyeing Company, of Brooklyn and New York, has been granted a one-year extension by its creditors and will be continued after a reorganization. Under the extension plan indorsed by the creditors at a recent meeting held in New York, new capital is to be put into the business and the outstanding accounts are to be immediately liquidated. The liquidation value of these accounts was put at $150,000. There are 300 creditors.

DU PONT ADDS SULFOGENE YELLOW

To its line of sulphur colors of low copper content the Dyestuffs Department of E. I. du Pont de Nemours & Co. has added Sulfogene Yellow CF. This color is described in the announcement as having very good solubility, good fastness to ironing, washing, water, alkali, perspiration, steaming and rubbing. It is further claimed that it levels well and exhausts well, and is a suitable yellow for use in combination with other sulphur colors for shades of khaki or olive drab.

CARD DISPLAYS UNION WOOL DYES

A new sample card just issued by the Society of Chemical Industry and distributed in the United States by the Ciba Company, Inc., exhibits forty-two half-wool dyestuffs and sixteen polytex colors. The half-wool dyes are applied in the shortest possible bath with 10 to 30 grams crystallized Glauber salt per liter (boiling). The polytex dyestuffs serve to color mixed weaves of wool, cotton and silk. They are dyed from a boiling bath with the same quantity of Glauber salt per liter required by the half-wool colors, and are permitted, if necessary, to draw on cotton and silk with shut-off steam. The dyeings in the card are distinguished by their even dyeing of the various threads.

NEW GENERAL DYESTUFF CARDS SHOW RECENT COLORS

Swatches of piece goods and yarn are displayed and dyeing properties are given in a series of leaflets issued recently to the trade by the General Dyestuff Corporation, New York, to announce the manufacture of several new dyestuffs. Circulars of this type have been issued describing the qualities and application of Fastusol Green BB, Supranol Brilliant Red B, Fast Red RBE Base and Variamine Blue B.

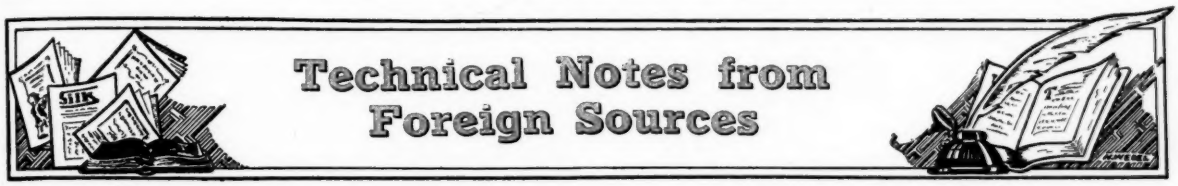
Fastusol Green BB is a new homogeneous direct cotton dye which, it is claimed, is particularly valuable for its fine shade in artificial light, its fastness to rubbing and its very good fastness to scrooping. The leaflet states also that this color has very good leveling properties and good solubility. It is primarily recommended for dyeing cotton, rayon and other vegetable fibers, but is also suitable for unweighted silk from an acetic acid bath. It is said to be well suited for union and half-silk dyeing, wool and silk being only slightly stained.

Bright red shades of a bluish hue are produced by the new Supranol dyestuff, Supranol Brilliant Red B, according to the description of its properties. The leaflet describes this color as possessing good fastness to washing, milling and stoving, and excellent fastness to water and salt water and to light. It is classed as an excellent color for the dyeing of knitting and hosiery yarn, sweaters, bathing suits, etc., but is also said to be suited for the dyeing of tin-weighted silk, on which it produces shades of good fastness to water and washing.

The third new production announced by General Dyestuff Corporation is an addition to the group of insoluble azo colors made by General Aniline Works, Inc., and is known as Fast Red RBE Base. On Naphthol AS-SW and AS-TR prepare it produces a clear shade of red of bluish cast similar to but slightly bluer than the old Turkey Red. It is claimed that the fastness properties of these two combinations are excellent throughout, and it is further stated in the circular that the reds obtained on both the above-mentioned Naphthols withstand kier boiling under pressure and are therefore suited for colored bleach goods as well as toweling.

Another leaflet describes the properties of a new coupling agent for Naphthol AS products, this being designated as Variamine Blue B, which, it is stated, produces on various naphthol grounds a line of brilliant navy blue shades of good all-around fastness properties. At the same time a new naphthol, AS-E, is also being placed on the market. This color can only be used in conjunction with Variamine Blue B, and produces with it, according to the manufacturers, a very bright blue with good fastness to chlorine bleach.

A group life insurance policy has recently been acquired by the employees of the Wennonah Cotton Mills Company, of Lexington, N. C., through the Prudential Insurance Company of America. The total amount of the policy involved is $73,200, covering 108 lives. Each worker is insured in amounts ranging from $600 to $1,500, according to the rank or position held, and the policy is of the contributory type, the workers themselves paying a part of the premiums and the employing company assuming the remainder of the expense.



Dyeing of Cellulose Esters

German Patent No. 432,100; *I. G. Farbenindustrie, A.-G.*—The group of dyestuffs recommended for this purpose are the aldehyde-bisulphite compounds of insoluble or difficultly soluble azo dyestuffs, as well as the formaldehyde-bisulphite derivatives of azo dyestuffs which possess free amino groups. An example cites the use of a dyestuff produced by coupling diazotized p-nitroaniline to the formaldehyde-bisulphite compound of methyl-aniline. Thus, 1.5 parts of this product are dissolved in 1,000 parts of water, with 10 parts by volume of 13% soda solution, and 50 parts of cellulose acetate dyed in the bath for one hour at about 60° C. A deep orange tone is thus produced.

Application of Sulphur Dyestuffs in Non-Alkaline Solutions

German Patent No. 432,112; *I. G. Farbenindustrie, A.-G.*—By treating the dyestuff with hydrosulphite or other reducing agent as usual, in the presence, however, of magnesium hydroxide, the dyestuff vat does not react alkaline, and can be employed for dyeing animal fibers and cellulose esters, as well as (in paste form) for printing any sort of fabric whatever, as the copper rolls are not affected.

Application of Vat Dyestuffs

German Patent No. 432,726; *Durand and Huguenin, Basle (addition to German Patent No.* 418,487).—See the preceding abstracts of German Patents Nos. 431,501 and 431,250. The affinity for certain fibers, as, for example, cotton, viscose, for the ester salts of leuco vat dyestuffs, is increased by addition of salts, such as common salt, Glauber salt, etc., to the bath.

Dyeing of Animal Fibers

German Patent No. 433,145; Leopold Cassella & Co.—The treatment of wool with formaldehyde is covered in German Patents Nos. 144,485 and 146,845, but these relate to the protection of wool against the influence of alkalies. In German Patent No. 344,528, the use of aldehydes in the carbonizing of wool is protected. The present case involves addition of aldehydes, for example, 4 to 6% of formaldehyde, to acid dye baths; or, in place of aldehydes, substances which split off aldehydes in presence of acids. It is claimed that wool or felt can thus be dyed without losing their capability of being fulled.

Application of Vat Dyestuffs

German Patent No. 433,146 (*addition to German Patent No.* 418,487, *already referred to*); *Durand and Huguenin, Basle.*—Another patent referring to the group of ester salts of the leuco vat dyestuffs. In German Patent No. 431,250, abstracted above, the goods are padded in a bath containing the ester salt of the leuco vat dyestuff and an oxidizing agent which is inert while neutral or alkaline; and the goods are, after drying, developed in an acid bath, which liberates the oxidizing agent's patent activity. In this present case the goods are steamed, instead of being exposed to heat and passed through an acid bath. As before, the goods may be printed, previous to development, with pastes capable of giving white or colored effects, as mentioned in German Patent No. 431,250.

Water-Soluble Vat Dyestuffs

German Patent No. 435,787 (*addition to German Patent No.* 424,981); *Durand and Huguenin, Basle.*—Another patent relating to the solubilizing of vat dyestuffs by reacting their leuco-compounds with chlorsulphonic acid in the presence of a tertiary base, with or without the addition of an inert diluting medium. This new development covers the use of salts (e. g., the sodium salt) of chlorsulphonic acid, in place of the free acid.

Protection of Animal Fibers in Dyeing with Mordant Dyestuffs

German Patent No. 435,899; *I. G. Farbenindustrie, A.-G.*—Sulphonic acids, or their alkali salts, of resinous compounds are prepared by condensation of aromatic or hydro-aromatic hydrocarbons with halogen derivatives of hydrocarbons, alcohols, sulphur chloride, etc. Such compounds, added to the dye or mordanting bath, enable the material to be dyed successfully without no great harm to the fiber as is the case with the ordinary mode of dyeing. In one example given, for wool, 1% of the sodium salt of "benzyl-naphthalene-resinosulphuric acid" is added to the dye bath, in dyeing with 2% of Acid Alizarine Brown B.

Solubilizing of Vat Dyestuffs

German Patent No. 436,176 (*addition to German Patent No.* 424,981); *Durand and Huguenin, Basle.*—In preparing solubilized vat dyestuffs, the leuco-compound of the dyestuff is reacted with chlorsulphonic acid in the presence of a tertiary base such as dimethyl-aniline, and possibly some inert diluting agent. It is claimed here that fuming sulphuric acid, and even sulphuric anhydride,

may be successfully employed in place of the chlorsulphonic acid. In one example given, chlorbenzene is mentioned as the diluting agent.

Ice Colors of the Naphthol AS Series

German Patent No. 436,365; *I. G. Farbenindustrie, A.-G.*—The Naphthol chosen as the second component is that produced by condensation of m-xylidine (asymmetric) or one of its substitution products, with 2-hydroxy-3-naphthoic acid. If to this base is coupled diazotized aniline (working as usual for ice colors), dyeings of no special value are obtained. But if diazotized m-xylidine, or one of its substitution products, is used in place of aniline, the dyeings are far more fast to light and kier boiling, as well as being more full and clear in tone.

Black Dyeings in Naphthol AS Series

German Patent No. 436,389; *I. G. Farbenindustrie, A.-G.*—The point of the patent lies in the use, as first component, of diazotized benzaldehydo- azo-alphanaphthylamine (prepared by coupling diazotized m-aminobenzaldehyde to alphanaphthylamine in acid medium). This substance, diazotized and coupled to arylides of the Naphthol AS series, gives blacks, dis-azo, of course, which possess excellent fastness to light and kier boiling.

Pyrazolone Dyestuffs

German Patent No. 436,790.; *I. G. Farbenindustrie A.-G.*—Pyrazolones, or pyrazolone derivatives, such as the carbonic acids, of a type derived from amino-diarylsulphones, are used as second components, and to them are coupled various diazotized amines in the usual way. The new products are claimed to be of a fastness far superior to other pyrazolone dyestuffs, dyeing mostly yellows. Those which contain an ortho-carbonic acid group in the pyrazolone nucleus are especially useful as chrome dyestuffs.

Azo Dyestuffs for Cellulose Acetate

German Patent No. 437,071; *I. G. Farbenindustrie A.-G.*—The patent involves the use of certain new second components, generally to be designated as the omega-amino-alkylated derivatives of beta-naphthylamine (alkylated in the amino group to give a secondary base). Various derivatives of such components may be used; for example, the acetyl derivative of omega-amino-N-ethyl-beta-naphthylamine. To such second components the usual series of diazotized amines is coupled. The dyestuffs formed in general dye wool in pure, level tones. Such as contain in the first component only one sulpho or carboxyl group possess good affinity for fibers of the type of cellulose acetate.

Oxidation of Fatty Substances upon Spun Fibers

H. Pomeranz; Der Textil-Chemiker u. Colorist 9, 165 (1928).—Methods of investigation of fats and oils, as carried out to-day in practice, can be called only conventionally analyto-chemical. The analysis of fats and oils does not have for its purpose the clearing up of their chemical composition, nor the separation or determination of the separate constituents of a given sample, but only the obtaining of definite information for the practical use of the substance. Therefore, the methods of investigation are only a repetition, on the small scale, of the processes of working up the material to technical products, in such a manner that results can be given in exact figures and tabulated for convenience in use. It hardly needs to be mentioned that conditions in such analyses are quite different from what prevails on the large scale, yet such routine methods of examination do have some value up to a certain point.

As an example, consider the saponification number of fats. The soap-boiler wishes to know how much caustic liquor to take in order to change a certain amount of a fat into soap. The saponification number should give the answer to this question. But the manner in which the test would be carried out leaves no doubt that a mixture of fat and caustic liquor in the proportions arrived at through determining the saponification number would not give a correct result; for the analytical saponification is carried out in alcoholic solution, while the saponification in practice is in an aqueous medium. In the latter case the soap is colloidally dissolved; the combination of the fatty acids with the alkali to form salts does not follow stoichiometric rules; the compound formed is also partly broken down by the water. Results with indicators as to the amounts of free fatty acids or free alkali are not decisive; and the practical soap-boiler is guided, not by the directions of the chemist, but by "rule of thumb." The analytic determination of the saponification number has for the soap-boiler only a relative value; wholesalers and middlemen are the ones who make the most use of such figures in their advertisements.

Some of these tests are, however, of the highest value in some cases, and efforts to refine and supplement them are well justified. The so-called Mackey test, for the undesired combustibility of the oleins, is a case in point. Regarding it the following may be stated:

Fibers for spinning, in particular wool, partly also the so-called artificial cottons, are oiled before spinning in order to make easier their working up, and also to give the yarn a more handsome appearance. This oiling is carried out by working up technical olein into an emulsion with soda solution or any such emulsifying agent, wetting out the fiber in this emulsion, and drying. The fiber is thus covered with a thin layer of oil. The drying is carried out in rooms laid out for this purpose, which are heated to about 30° to 50° C. The length of the drying varies according to the freedom of air circulation, the quantity of wool, etc.

Fatty oils are oxidized by the oxygen of the air, when they are spread out over a large surface and exposed to a temperature higher, even slightly, than the room temperature. The process of oxidation is the same as that involved in the "blowing" of oils, treatment with oxidizing agents, etc. The fatty acids go over to the so-called oxy-fatty acids, whose true chemical nature is even today not clearly understood. Lewkowitsch, the most careful and gifted investigator in this group, calls them oxidized fatty acids, a poor name; we know only that they approach more or less the nature of castor oil, a product available from natural sources in large quantities, and a most valuable textile chemical. It seems that the oxygen attaches itself to the same part of the carbon chain to which iodine adds on (in the determination of the iodine number). We do not know whether the oxygen forms hydroxyl groups, in so attaching itself, but this seems probable.

The oxidation reaction of oils is an exothermic one—a certain amount of heat is set free—and this under some conditions leads to the oil bursting into flame, especially where other combustible material is at hand, as in the case of oiled wool. So it is that not infrequently lots of oiled wool, etc., suffer spontaneous combustion. Any oiled fiber is a fire hazard, if it is exposed to warm air; it is particularly dangerous, if the olein consists of multiply unsaturated fatty acids. Evidently the spinner ought to have exact information as to the oxidizability of the olein used by him.

The determination of the iodine number gives valuable information as to this question, though a low iodine number is no proof that the olein is not easily oxidizable, for even saturated fatty acids are not wholly indifferent to the oxygen of the air. Further, the complex of fiber fat is a different proposition than the fat alone. A good test must reproduce as closely as possible, on the small, laboratory scale, the conditions prevailing on the technical scale, so that results in definite figures will have some meaning for the practical man. The Mackey apparatus fulfills fairly well this requirement. As the reader knows, it consists of a well insulated double vessel heated with boiling water, within the chamber of which is placed a hand full of wool weighing 7 g., which has been treated with 14 g. of the olein in question; and the rise in temperature of the wool is followed by means of a thermometer. Although the conditions prevailing in the test are quite different from those obtaining in practice (higher temperatures and more olein), yet the behavior of a given sample of olein does give a certain means of estimating its probable behavior on the large scale; and a rapid rise in temperature of the mass can rightly be taken as a sign of high oxidizability and consequently of danger of spontaneous combustion, and a quiet heating up of the mass may be taken as good evidence of the safety of the olein.

Oleins derived from tallow appear from experience to be safe; those of other sources to be easily oxidizable and therefore dangerous.

The principle of the Mackey test has assumed much greater importance since the discovery that an addition of very small amounts of beta-naphthol to the olein causes even the most dangerous oleins to behave in the Mackey apparatus like the most harmless ones. The question arises, does this mean that the naphthol changes the olein in a mysterious way into another substance which possesses the property of a combustible fat, or does it mean that the Mackey test is entirely undependable, and leads to most vexing illusions, to the disadvantage of the olein consumer?

The author's view is here a purely practical one: to lay the situation so clearly before the textile chemist that he can form his own decision, or, in case experimental data are desired, can himself decide by experiment.

Naturally, it cannot be a question of the trans-substantiation of an oxidizable olean into an incombustible one (in the special sense here used), through the influence of beta-naphthol. It can be a question only of the delaying of the reaction between olein and oxygen during a certain time at a certain temperature. Other cases of delaying or postponing of a reaction are known in the fatty series: certain additions, as, for example, of phenols or naphthols, delay the drying of oils for a certain time, even in the presence of siccatives. If we hold to the theory that the drying, as well as the spontaneous heating of oils, is a result of their oxidation, and it can hardly be anything else, we have an analogous case in the oxidation of sodium sulphite to sulphate through the blowing in of air, which, in the presence of small quantities of certain substances, among them phenol, can be considerably delayed. Now, the oxidation of sulphite to sulphate is a sort of complete combustion. With olein, we are dealing only with a definite stage of oxidation which, so to say, comprises only one question, whether it be the removal of a double bond, or the change from a hydrogen atom to a hydroxyl group. It is conceivable that the presence of small amounts of beta-naphthol delays the first stages of the reaction of oxidation of the olein, and that, when the duration of this inhibition has lasted so long that the oiled, fibrous mass can dry out, the danger of spontaneous combustion is practically removed. But to be able to prove this, experiment would be necessary.

A delay in oxidation in the Mackey apparatus at about 100° C. for one or more hours cannot serve in many cases as a proof of safety against spontaneous combustion. An actual proof would be the delaying or inhibition of any oxidation at the temperature of the drying room for a time equal to the ordinary duration of the drying process, which sometimes amounts to ten to twelve hours, sometimes to days; and care would have to be taken that the material was freely exposed to air on all sides.

Such a test with an olein under examination (and we ought also to add, with the fiber under examination) would have to be carried out in such case, since each

olein sample and each fiber necessarily behaves differently. We are thinking, then, of an apparatus like the Mackey apparatus, in which the temperature of the large-scale drying chamber is maintained, and through which air of the same temperature is freely circulating. In this apparatus will be placed a certain quantity of the fiber, oiled with the olein in question, in a way most closely approximating the method used on the large scale; and in the apparatus any alteration of temperature must be capable of being carefully followed. In a parallel pair of such apparatus the olein in question may be examined, one sample as received, and the other with beta-naphthol added, for a considerable time, for one to two days. A difference in the wool mass of a few degrees over the temperature prevailing in the chamber, a difference which, in the case of the naphthol-treated sample, does not exist, will determine decisively whether the addition of naphthol will obviate the danger of spontaneous combustion. For where there is no oxidation there can be no danger of fire.

Such a test has not yet been carried out.

CHEMISTS DEVELOP COTTON SUBSTITUTE FOR PARACHUTE SILK

A chemically treated cotton fabric designed to replace the standard imported silk material used for parachute cloth has been developed by the United States Bureau of Aeronautics through research carried on with the Bureau of Standards, according to a statement recently issued by the Department of the Navy.

The chief source of raw materials for use in the construction of the sails of parachutes has been silk grown in China, Italy and Japan. Realizing if for some reason the United States was cut off from these sources of supply we would be forced to use untried substitutes, the Bureau of Aeronautics, Navy Department, requested the Bureau of Standards to co-operate in the development of a suitable substitute of domestic origin that would favorably compare with silk. Cotton, being the most abundant and cheapest domestic fabric available, was selected as a basis. The result was the development on a laboratory scale of a two-ply cotton yarn from which fabrics have been woven in sufficient quantities to manufacture standard-size parachutes.

The yarns are subjected, either before or after weaving, to a specially developed chemical treatment which tends to impart to the fabrics additional strength and some of the desirable properties of silk. Although the weight of this fabric is slightly greater than that of silk fabric, its breaking strength, resistance to tear, elongation and air permeability compare favorably.

This yarn material will be manufactured into parachutes of standard size and construction at the Naval Aircraft Factory at Philadelphia, the statement said. These parachutes will be tested in comparison with the Navy silk parachutes of imported material by dropping them, loaded with a 180-pound dummy, from an airplane traveling 100 miles an hour at an attitude of 1,000 feet, the statement added.

PLAN TO BUILD AMERICAN I. G. PLANT IN LOUISIANA DENIED

Contrary to certain vague reports recently current, a chemical plant will not be erected and operated by the American I. G. in the State of Louisiana, according to the statement by that firm's representative.

The original report circulated in the chemical industry a few weeks ago asserted that the American I. G., in alliance with the Standard Oil of New Jersey, will establish a twenty-million-dollar plant in Monroe, La., and that Harvey C. Couch, a railroad and public utilities man from that State, had begun negotiations with both companies. The statement issued from the New York office of the American I. G., however, denied this story, saying:

"Reports published this morning referring to the American I. G. Chemical Corporation are unfounded. This corporation has no negotiations whatsoever pending with any public utility group or other interests for a plant in Louisiana."

Officials of the company would not authorize any further information on this report, but it was learned that patents on dyestuffs are not among those owned by the American I. G., inasmuch as the General Aniline Works, Inc., formerly the Grasselli Dyestuff Corporation, has a contract with the I. G. Farbenindustrie to work in this country all dyestuff patents of the German concern registered here.

A new branch office of the Permutit Company, manufacturers of water softeners, filters, and other apparatus for removing impurities from water, has been opened in the Montgomery Building, Spartanburg, S. C. The new office will be in charge of R. V. Irwin, who for the last six years has been manager of the Permutit Company's office in Chattanooga. Mr. Irwin's new territory will comprise North Carolina, South Carolina, and the eastern portion of Georgia.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

PRINT WORKS MAN

Young British man desires position in fabric print works. Experience in vat color development, discharge, Rapid Red and clearing (chemick) on open soaper. Practical knowledge of all British methods. Accept moderate salary if chance to improve. Age 23. Address Classified Box 541, American Dyestuff Reporter.

LABORATORY MAN

Dyestuff firm has opening for man in laboratory; must have chemical training and some knowledge of printing. Address: Classified Box No. 542, American Dyestuff Reporter.